THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXV. No. 1920.] LONDON, FEBRUARY 27, 1900. [52ND YEAR. PRICE 6d.

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

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The Wallsend & Hebburn Coal Company, Ltd.
8 Lombard Street,
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W. RICHARDSON, Fitter.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
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WELDON MUD
FOR
GAS PURIFICATION.
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
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Parker's Imperial Black Varnish,
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Prices and Analysis of all the Scotch Cannels on Application.

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TUBES
And Fittings and Accessories.

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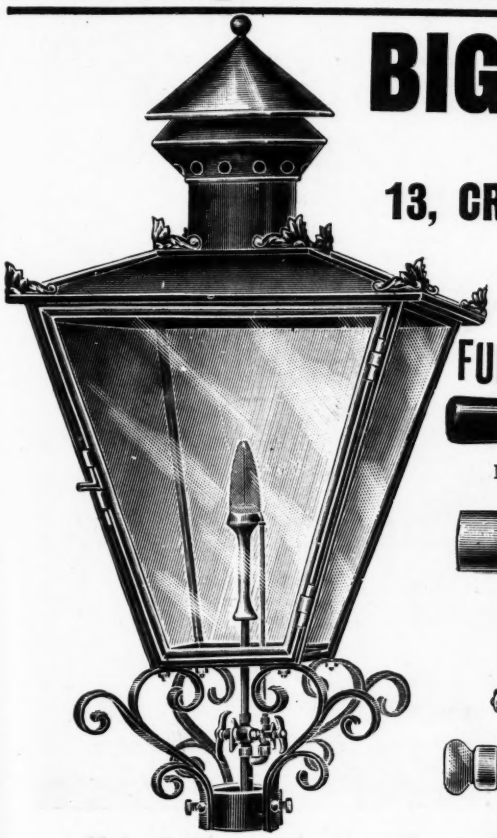
MANUFACTURERS OF
WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.
BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.
LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.



BIGGS, WALL, & CO.,
GAS AND WATER ENGINEERS,
13, CROSS STREET, FINSBURY PAVEMENT,
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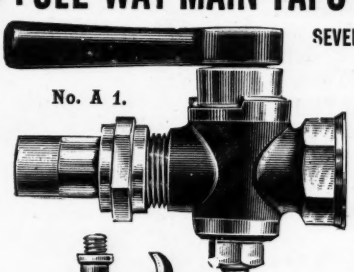
FULL-WAY MAIN TAPS & LANTERN TAPS.
SEVERAL DESIGNS SHOWN BELOW.

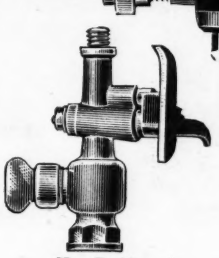

No. A 1.

THESE TAPS ARE
FULL-WAY
AS SHOWN.

No. A.

SUPERIOR QUALITY AND FINISH IN GUN METAL.

LANTERN TAPS.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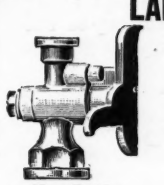
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No. A 12.

No. A 1.

The "DEMAND," REGISTERED. *
*Specially constructed for New Incandescent Burner.

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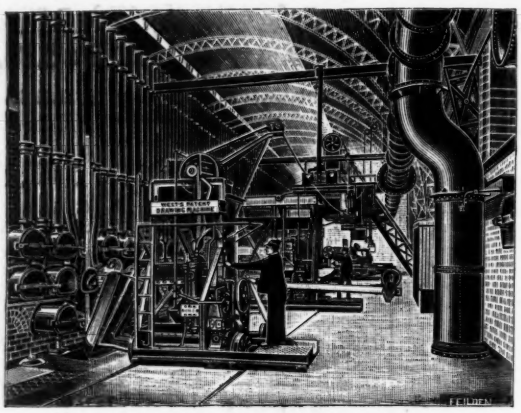
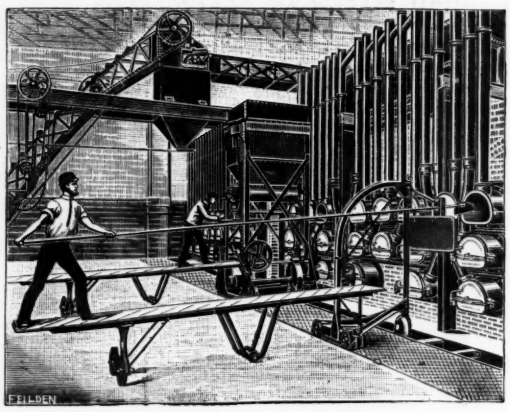
ALBION IRON-WORKS, MILES PLATTING,

And 104, QUEEN VICTORIA STREET, LONDON, E.C.

MANCHESTER.



West's Compressed Air Charging and Drawing Machinery for Gas-Retorts.



West's Manual Charging and Drawing Machinery for Gas-Retorts.

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Silent Coke-Conveyor.

SPECIAL FEATURES:

This Conveyor is specially adapted for Elevating and Storing Coke in the Coke Yard or Overhead Hoppers.

SILENT IN ACTION, and is easily driven; the power required for driving being very small.

Has easily renewable and inexpensive wearing parts.

Is fitted with HUNT'S PATENT ROLLER CHAIN, which is specially adapted for the conveying of gritty materials, as the Rollers prevent excessive wear of the Chain Wheels.

The working parts of the Chain and Slide-Bar are easily and efficiently lubricated by a special lubricator fixed at one point.

No Rivets or Bolts in the Chain to work loose; the whole of the Chain being kept together by the Joint Pins.

DOES NOT MAKE ANY BREEZE, as the Coke does not roll over in its passage along the Conveyor; and no violent rubbing of the pieces against one another occurs.

CONTRACTORS FOR

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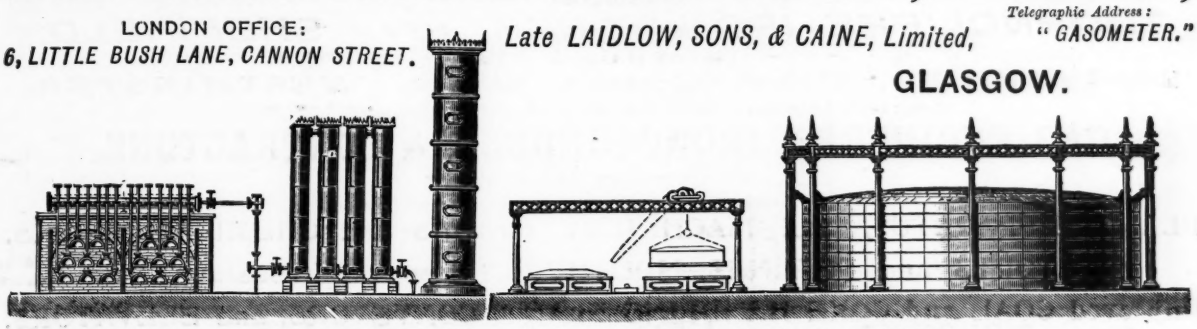
Telegraphic Address:
"GASOMETER."

GLASGOW.



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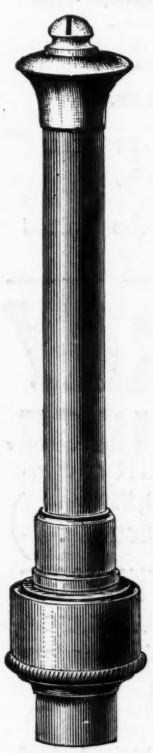
Telegraphic Address: "ORME, OLDHAM."

ATLAS METER WORKS, OLDHAM.

National Telephone No. 93, OLDHAM.



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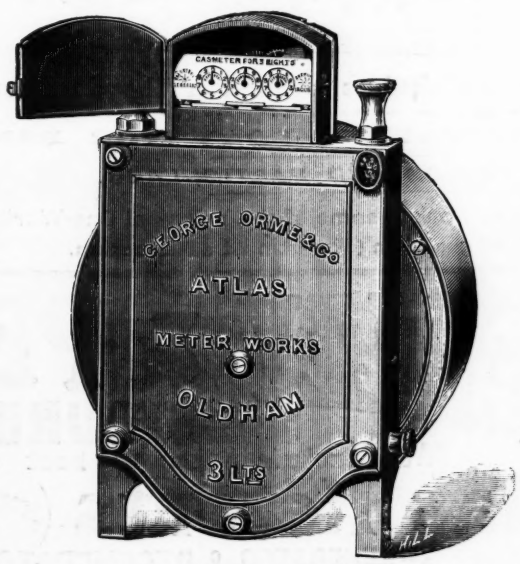

WET GAS-METER IN CAST-IRON CASE.

DRY GAS-METER IN STRONG TIN-PLATE CASE.

ORME'S GAS REGULATOR FOR STREET LAMPS.

AS ILLUSTRATION NO. 200.

Adopted by the leading London and Provincial Gas Companies. More than 150,000 now in use.

Main Gas Cocks, Pressure-Gauges, & all descriptions of Gas, Water, & Steam Fittings in stock.

Illustrated Price Lists and full Particulars on application.

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Manufacturers of every description of

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RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

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PURIFIERS with Planed Joints a Speciality.

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DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

PIG IRON (Special Quality) for Engine Cylinders. GAS COAL famous for its UNRIVALLED EXCELLENCE.

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SOLE MAKERS OF HACK & PIGGOTT'S PATENT COKE-CONVEYING PANS AND LINKS COMBINED.

COKE-CONVEYORS.

Specialities:

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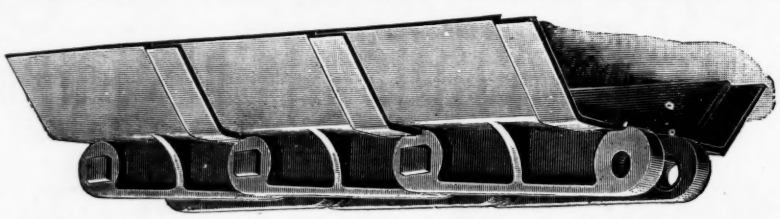
Rope and Belt Pulleys, Spur and Bevel Wheels, Shafting and Couplings, Pedestals, and Fixings.



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Conveyors, Elevators, Grinding Machinery, Motors.

The only Coke-Conveyor which has proved a thorough success.

ALSO HACK AND GILES' PATENT CONVEYOR PAN LINKS.

WRITE FOR PRICES AND PARTICULARS.

The fullest Inquiry invited. Can be seen at work in some of the principal Gas-Works in the United Kingdom, where they are giving the utmost satisfaction.

MOBBERLEY & PERRY

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Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES; BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c., &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

London Agents: Contractors for the erection of Retort-Benches complete.

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WELSBACH INCANDESCENT GAS-LIGHT.

NEW WELSBACH BURNERS.

25 Candles per Cubic Foot of Gas.

This is the Burner exhibited at Niagara Hall, London, and throughout the Provinces.

The New Welsbach Burner is used without a Chimney.

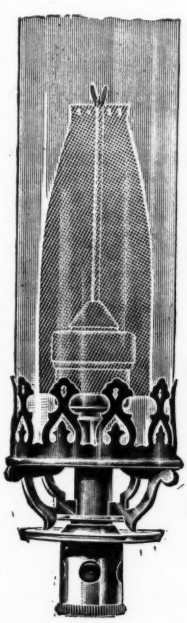
Suitable for Indoor and Outdoor Lighting.

Supplied in SIX Sizes,

Consuming from $\frac{3}{4}$ to 7 Cubic Feet of Gas per Hour.

Price from 5/- upwards.

MANTLES from 9d. each.



"C" WELSBACH BURNER.

REDUCED PRICES.

"C" Ordinary Burner, 5s. 0d.

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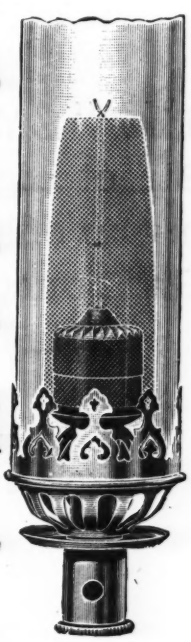

THE "YORK" WELSBACH BURNER

A CHEAP FORM OF THE "C" BURNER.

50 to 60 Candle Power with $3\frac{1}{2}$ to $3\frac{3}{4}$ Cubic Feet of Gas,

Price complete with MANTLE and CHIMNEY, **4/-.**

MANTLES FOR "YORK" BURNER, **1/-** EACH.

ALL THE ABOVE PATTERNS CAN NOW BE SUPPLIED.

Complete Price List on Application.

The Welsbach Incandescent Gas-Light Co., Ltd.,

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LONDON. S.W.

THE

DENAYROUZE LIGHT SYNDICATE

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THE PIONEERS

OF INCANDESCENT BURNERS

WITHOUT CHIMNEYS.

The "SMALL TORCH" Burner (Bandsept Patent) for Street Lighting, consuming 3½ feet of Gas per hour. Having an efficiency of 25-Candle Power per Cubic Foot of Gas consumed, it is not only the BEST but CHEAPEST Intensive CHIMNEYLESS Burner on the Market.

PRICE COMPLETE WITH MANTLE

4s. 9d.

All other Burners supplied by the Syndicate proportionately Reduced, full Particulars of which will shortly be issued to the Trade, and followed by new and complete Catalogue.

NOTE—THE DENAYROUZE LIGHT SYNDICATE has carried out the work in connection with all the Installations of Van Vriesland's Oil Gas in England, together with the entire work and fitting of the Grand Exhibit in North-West Gallery of the Royal Aquarium, Westminster, where all their Burners can still be seen in operation.

BRAY'S

"SPECIAL" GAS-BURNERS.

SUITABLE FOR ALL PRESSURES AND CONDITIONS.

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GAS LIGHTING ENGINEERS,

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Telegrams:
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Telephone: No. 612.

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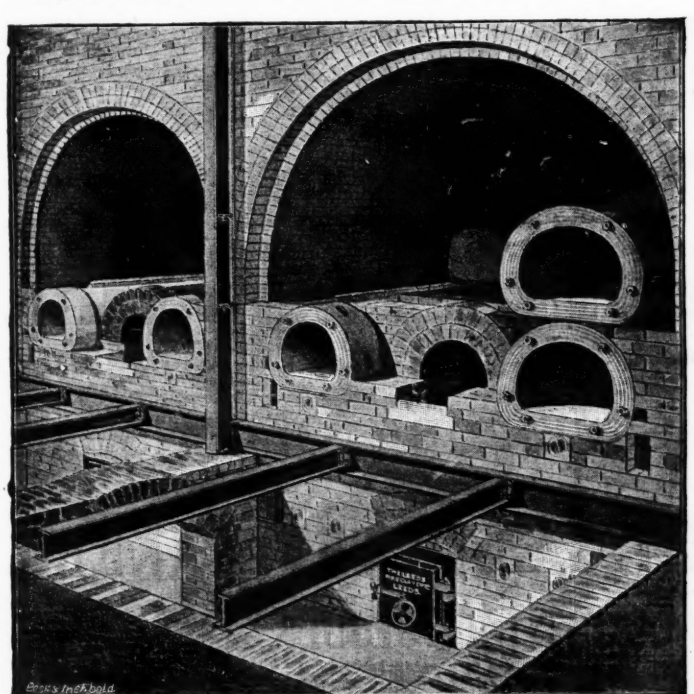

Engraved from a Photograph taken during Construction of our Shallow Regenerator Settings.

RETORT-SETTINGS

OF EVERY DESCRIPTION
INCLINED, HORIZONTAL,
REGENERATOR, GENERATOR,
and DIRECT FIRED.

SHALLOW REGENERATORS A SPECIALITY

MANY INSTALLATIONS.
EXCELLENT RESULTS OBTAINED.

RETORTS RE-SET.
RETORT IRONWORK.
COAL AND COKE-BREAKING AND CONVEYING MACHINERY.
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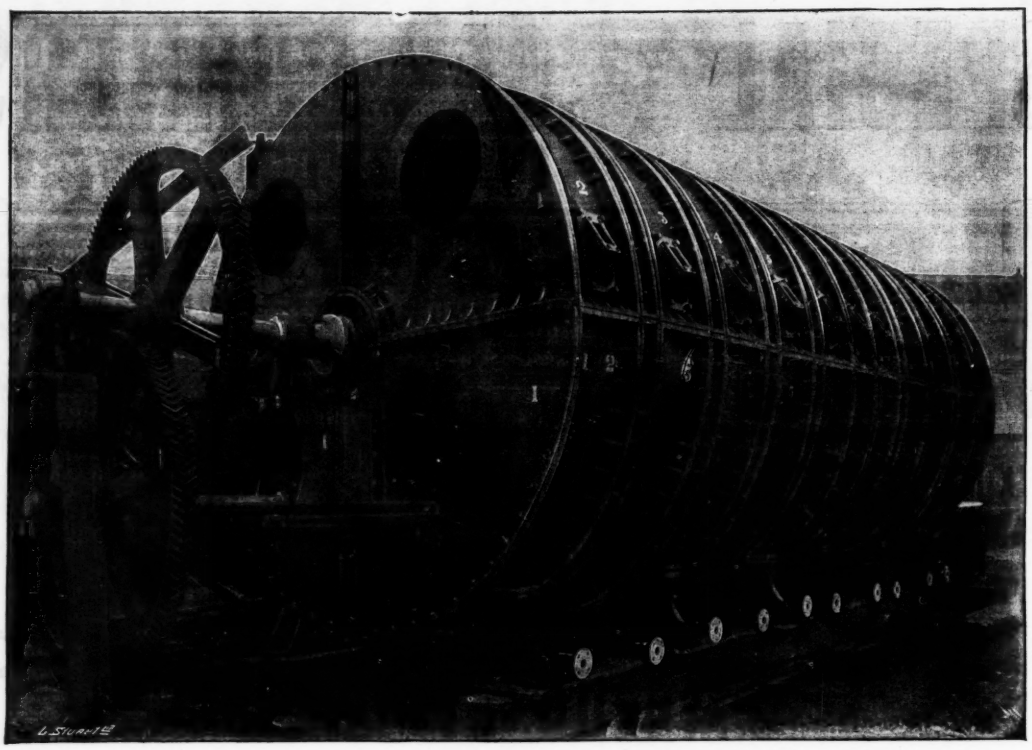
PATENT "NEW" SCRUBBER-WASHER

RESULTS GUARANTEED.



RESULTS GUARANTEED.

Photo. of Machine recently erected at Gaythorn Gas-Works, Manchester.

NOTE: Orders already received in **1900** for MACHINES to deal with **23,500,000** cubic feet of Gas per Diem.

[*Extract from Paper by* MR. T. N. RITSON, Assoc.M.Inst.C.E., of Kendal, *read before the* MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS, *June* 3, 1899.]

"A HOLMES' PATENT ROTARY 'NEW' WASHER-SCRUBBER was erected in the autumn of 1895, and is capable of dealing with half-a-million cubic feet of gas per day. This washer completely purifies the gas from ammonia, with from 10 to 12 gallons of water per ton of coal carbonized, leaving only 0·3 to 0·5 grain of ammonia per 100 cubic feet of gas at the outlet. Since this machine was erected, THE YIELD OF SULPHATE OF AMMONIA HAS BEEN MORE THAN DOUBLED."—"JOURNAL OF GAS LIGHTING," *June* 6, 1899.

[EXTRACT FROM ENGINEER'S LETTER.]

"I have pleasure in stating, that the Machine which you erected for me has MORE THAN FULFILLED YOUR PROMISE in every respect. Not only was the strength of the liquor obtained improved, and the outlet gas RENDERED NEUTRAL TO LITMUS PAPER, but the illuminating power was so much better than under the former conditions of Scrubbing, that the required standard of light was maintained, at a reduced average cost per ton of coal carbonized, equal to 7 per cent. I may add, that these particulars were confirmed by an Edinburgh Analyst, who tested the gas before and after the installation of your Scrubber-Washer."

W. B. McLUSKY, President W.A.G.E.

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GAS SERVICE CLEANSERS.

LAMP TORCHES.

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WROUGHT-IRON TUBES & FITTINGS.

STREET LAMPS & POSTS.

PRICE LISTS ON APPLICATION.

NEW SUNLIGHT INCANDESCENT CO., LTD.

33-34, SHOE LANE, LONDON, E.C.

THE

"SIMPLEX" CHIMNEYLESS BURNER

Manufactured under the De Mare MASTER Patent and subsequent Minor Patents.

SEE CAUTION BELOW.

IN THREE SIZES, as follows—

No. 2.
COTTAGE SIZE.

No. 3.
FOR SHOP AND INTERIOR LIGHTING.

No. 4.
STREET LIGHTING.

With SUNLIGHT WHITE MANTLE.

The "Simplex" is fitted with a Removable Cap and an Air-Adjusting Ring, making it quite easy for anyone to adapt the Burner to the very varying Pressures and Qualities of Gas in different parts of the country.

The "Simplex" Burner is so constructed as to make the light practically shadowless; and this, coupled with the fact that it is of a much more artistic shape, gives it an enormous advantage over the very unsightly competing infringement for the moment on the market.

Maximum Light (without artificial pressure) 125 Candle Power.

CAUTION! CAUTION!! CAUTION!!!

INCANDESCENT GAS LIGHTING.

All Dealers and the Public are **CAUTIONED** against Buying, Selling, or Using **"NEW WELSBACH"** (commonly known as the **"KERN"**) **BURNERS.**

ACTIONS FOR INFRINGEMENT OF PATENT HAVE BEEN COMMENCED by the **NEW SUNLIGHT INCANDESCENT COMPANY, LIMITED**, against the **WELSBACH COMPANY** for Infringement of the **DE MARE PATENT** by the **MANUFACTURE AND SALE** of such Burners, and are about to be commenced against Dealers and Users for Infringement of our Patent in respect of their Sale or Use. **USERS** are equally liable with **DEALERS.**

NEW SUNLIGHT INCANDESCENT CO., LTD.

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S. CUTLER AND SONS, MILLWALL, LONDON.

GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

CUTLER'S PATENT GUIDE-FRAMING HAS BEEN ADOPTED FOR MANY IMPORTANT HOLDERS.

Carburetted Water-Gas Plant.

SPECIAL DESCRIPTIVE CATALOGUE ON APPLICATION.

PATENT WATER-TUBE CONDENSER

Over 120 now in use.

Cutler's Patent Freezing Preventer

For keeping Cups of Gasholders free from Ice.

CHARLES HUNT PATENT GAS-WASHER.

R. LAIDLAW & SON,

ENGINEERS & IRONFOUNDERS,

CAST-IRON PIPES

ALL SIZES.

MANUFACTURERS OF

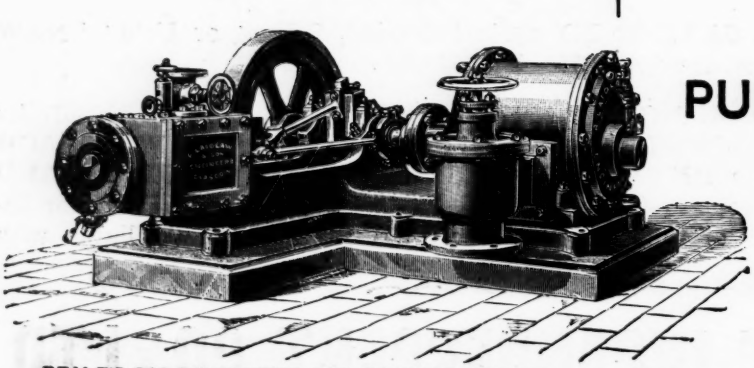
STEAM-ENGINES,

EXHAUSTERS,

VALVES,

AND

PUMPING-ENGINES.



BEALE'S GAS EXHAUSTER AND ENGINE COMBINED. ALL SIZES.

ALL KINDS OF

GAS AND WATER APPARATUS.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

THE EAGLE RANGE & GAS-STOVE CO., LD.

(Late ARDEN HILL & CO., Ltd.),

"ACME" GAS-STOVE WORKS,

ASTON, BIRMINGHAM.

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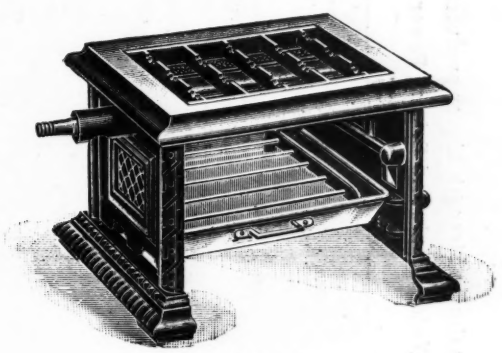

No. 40C.

A new set of "ACME" Grillers, specially made to stand rough usage.

Sample of either sent on application, Carriage Paid.

Prices from 6/6 to 14/6.

LARGEST MANUFACTURERS IN THE UNITED KINGDOM OF GAS-RETORTS,

HORIZONTAL or INCLINED; also Makers of SEGMENTAL RETORTS of all SECTIONS.

PATENTEES OF

MACHINE-FLANGED RETORTS

TELEPHONE No. 8010.

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B. GIBBONS, JUNR., LTD.,

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SPECIAL BRICKS and BLOCKS of every description for GENERATOR and REGENERATOR FURNACES.

"ABC" Code and UNICODE used for Telegrams and Cablegrams.

Large Stocks of Bricks of all sizes, Burrs, Boiler Seating Blocks and Covers, Plain and Rebated Tiles, &c., &c.

RETORTS and other FIRE-CLAY GOODS CAREFULLY PACKED for EXPORT.

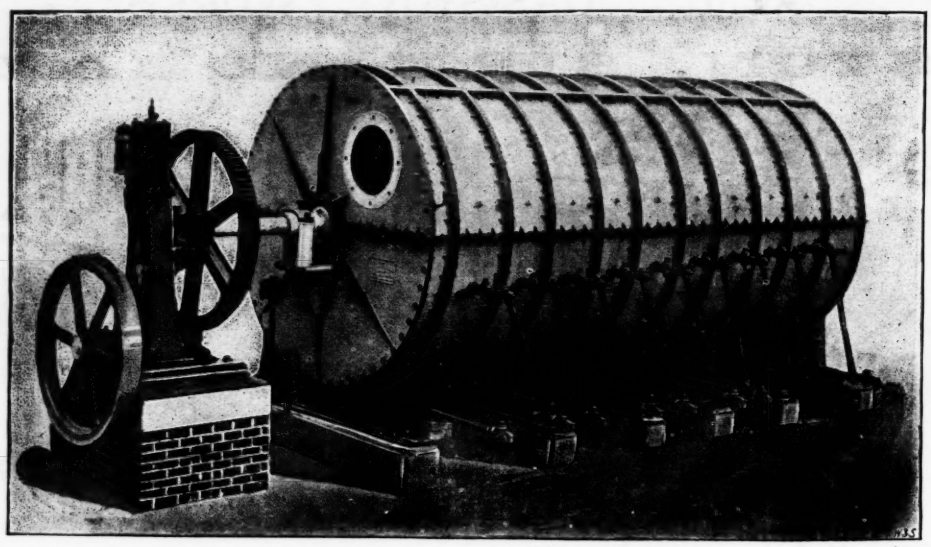
FOREIGN and HOME COPIES of ILLUSTRATED CATALOGUES on Application.

KIRKHAM, HULETT, & CHANDLER, LD.

PATENT "STANDARD" WASHER-SCRUBBERS

Complete Extraction of Ammonia and large proportion of CO_2 and H_2S.

Maximum Strength Liquor produced, Minimum Water Supply and Driving Power required.



Old Pattern Machines fitted with latest Improvements at Small Cost.

PATENT "STANDARD" WASHER-SCRUBBER (one of two) recently erected at the Devon Street Works of the Birmingham Corporation.

Nearly 600 in use.

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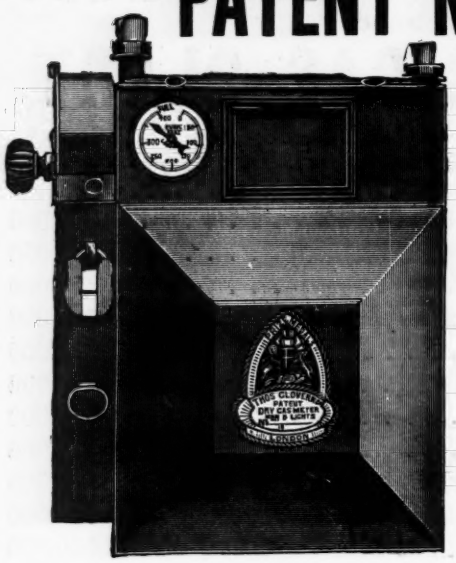

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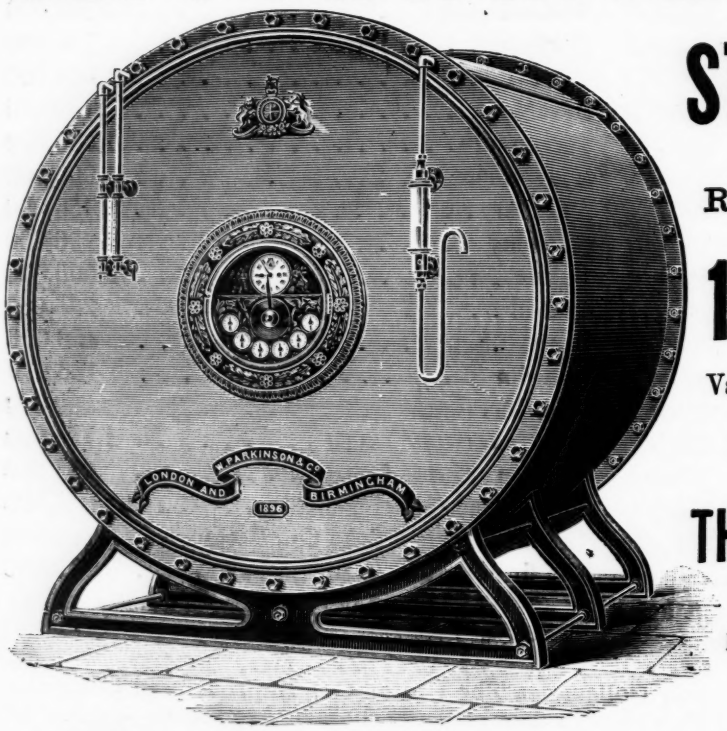

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

Our Coal Resources.

WE conclude to-day our review of the estimates made some thirty and more years since by the Royal Commission on the coal supply of the kingdom, of the stock of available coal in this country, and its probable duration. The estimates, and also the prognostications of Professor Jevons (which made so much stir at the time of their publication), we have compared with the actual statistics for the thirty years which have passed since they were made. The results of the comparison are to show that the forecasts of Professor Jevons were altogether wide of the mark, and that, although the Coal Commissioners slightly underestimated the increase in the consumption of coal, the calculation which they based upon a constant increase of three million tons per annum has hitherto proved substantially correct. According to the estimate, we have coal enough to last for another 250 years, and our examination of actual facts and future probabilities would only reduce this figure to about 200 years. That we shall go on steadily using more and more coal every year for the next two centuries, until the supply is suddenly and completely exhausted, is, however, for reasons which are discussed elsewhere, extremely unlikely; and the period named serves, not to indicate the date of the final working-out of the mines, but rather to enable one to form some idea of the length of time that will elapse before the increased price of coal, due to its growing scarcity and the enhanced cost of raising, will seriously check its use.

After a careful consideration of the available facts, there seems little doubt that a crippling of our industrial activity from such a cause will not be witnessed by any of those who may read these notes. We should, however, welcome the appointment, which is elsewhere suggested, of a Committee of experts to determine what proportion of our coal supply may be expected to be put upon the market at the same, or practically the same, cost per ton as the present average. We feel confident that such an inquiry would prove that we have a supply of easily accessible (which is to say cheap) coal sufficient to last for many years to come; but we are obliged to base this belief upon general rather than upon particular and official information. A perusal of the findings of the Commission, and a comparison of the estimates upon which these findings were based with subsequently ascertained facts, leave one thing certain beyond doubt. It is that, whatever else be the cause or causes of the present shortage of coal in the market, it is not a dearth of it in the mines. The one thing needed then to secure a return to reasonable prices, if not to the lowest quotations of recent years, is an accelerated output of the coal we possess. A 10 per cent., probably a 5 per cent., increase in the quantity raised would immediately prick the bubble of the present inflated rates. We are, of course, now speaking of more than the immediate future; for the departure of winter will witness a marked fall in Coal Exchange quotations. But, unless we are destined to experience a similar scarcity of coal next winter season, one of two things must meantime be brought about—a reduced consumption or an increased output. The signs of the times (the present condition and future prospects of the iron and steel trades especially) are not favourable to a reduced consumption. The question is, Will the output be increased?

There are two obstacles in the way of an immediately higher output. The one is the present scarcity of skilled miners, due to temporary causes. Of these, the prevalence of influenza is rapidly disappearing, and will soon cease to exist; but the chief source of depletion—the calling out of the Reserves, the Militia, and, just recently, the Veterans—appears likely to subsist for a good many months to come. Some of the vacancies so caused—most, indeed—have been, or will be, temporarily filled up from the ranks of the unemployed, which, however, are becoming rapidly exhausted. But skilled miners are not made in a day; and therefore, even if all places in the stalls are occupied, the output per man is likely for some time to be below the average. The other obstacle to an increased output in the near future is the considerable length of time that must elapse before fresh seams in our coal-beds can be tapped. The sinking of new shafts, and the getting of them into working order, is necessarily a matter of months, and often of years; so that not much immediate relief

of the situation is to be expected in this direction. Such addition to the supply as can be hoped for in the next season of maximum demand will come from pits that were left unworked, because unprofitable during the period of minimum prices. Were we responsible for the maintenance of a gas supply, we should not like to be found next autumn with a low stock of coal, and some of the winter requirements unpurchased.

End of the Hull Gasholder Litigation.

A REMARKABLE end has been reached by the gasholder litigation of the Sutton, Southcoates, and Drypool Gas Company. This case would fill a respectable-sized volume; and at last it came before the House of Lords, where, as one has grown accustomed to believe, all litigious parties receive their final *quietus* for this world. Doubtless, if some lawsuits could be carried to Mars or Saturn, or that great conference described by Milton, they would go there as a matter of course. As a fact, however, the House of Lords is charged, under the terms of the British Constitution, with the duty of giving the final answer to all legal questions arising in these realms; and the Law Lords never fail to rise to the measure of their responsibility—that is to say, they hardly ever shrink from solving the problems which continually come before them in the ordinary way. But the Sutton gasholder case was too much for them. The Lord Chancellor was the first to weaken. His Lordship had an interesting conversation with the Counsel on both sides, carried on in that charmingly free-and-easy style which is found only in the highest and the lowest Courts of Justice of the realm. For there is nothing at all terrifying about the House of Lords, sitting as the ultimate Court of Appeal. Its proceedings are as human and simply ordered as Petty Sessions; but they are usually very definite and to the point, as naturally follows from the ever-present consideration that their Lordships' words are the last that will be said concerning the matters in dispute. The Lord Chancellor, after his inquiries had been answered, found himself and his colleagues confronted with such a tangle of fact and law that he was unable to unravel it. As to the facts, there were three hypotheses, any one of which might be the true one; and whichever was adopted would determine the law. But which was the true hypothesis? When in doubt, ask Lord James of Hereford to settle it. This is the new rule of procedure in the House of Lords, and in not a few other connections also. At any rate, the Lord Chancellor asked the parties if they thought Lord James could assist them in coming to terms if they saw him in his private room. "He might conciliate them, and "give them some wholesome advice on which they could "come to terms." The Lord Chancellor was really and truly anxious not to destroy that gasholder by an injunction, which might be the due course of the law, but would be such a pity in all the circumstances! Lord James, when appealed to, was ready and willing to do his best to bring about a settlement—as he always is. When the list of the truly great and noble men who have served their country in this fleeting century comes to be made up, the name of Lord James will not be a long way down in the roll of honour. But—there is always a "but"—would the parties engage beforehand to follow the advice of Lord James? Because the peculiarity of this extraordinary reference was that its outcome should be as conclusive as the judgment of the House of Lords itself. The Lord Chancellor was properly firm upon this condition. He would not trouble Lord James in the matter unless his arbitrament was to be taken as final. This was eventually agreed to by both parties; and Lord James proved himself equal to the task. An agreement was arrived at; and the House of Lords was spared the trouble of applying good law to points of fact which could never be other than hypothetical. One would like to know what the legal profession think of this new fashion of referring a House of Lords appeal to arbitration. If this is to be the finish, why not begin with it, by asking somebody who commands the respect of both parties to act as judge and jury, and settle the difficulty out of hand?

The Liverpool Gas Company—The Question of Dearer Gas.

AT the half-yearly meeting of the Liverpool United Gaslight Company, the Chairman of the Board, Sir Edward Lawrence, had the now familiar tale to tell of difficulty in getting the usual and necessary supply of coal. His remarks on this tender subject were very much to the point; and yet they were not pitched in the tone of complaint that might have been called for if the Company had not been on the "weather side" of the coal people by virtue of their auxiliary carburetted water-gas plant. The Liverpool gas is of so high an illuminating power that the suitable coal supplies are necessarily limited in number and delivering capacity—a circumstance from which the Company have suffered acutely in the past. The Directors do not feel the pinch any more, however; and the factitious local agitation against their auxiliary carburetted water-gas production having died down, the tenor of the Chairman's speech of last Wednesday was less disturbed by controversial matter than has been the case for a long time past. The local electric light business of the Corporation has possibly contributed to produce this calm, by giving the critical minority of the city population something to think about besides the imaginary misdoings of the Gas Company. Liverpool has a nice job in hand in this affair! Meanwhile, Sir Edward Lawrence is able to announce that the business of the Gas Company is going on splendidly in all respects, and that the only cloud he can see in the future is the prospect that dear coal may impose upon the Company the necessity for raising the price of gas. There is no disputing the reality of this danger. Dearer gas will be inevitable, unless the coal market gives way; and it is to be hoped no Gas Company will be so ill-advised as to waste good reserve funds in withstanding the pressure.

Mr. T. N. Ritson's Address.

THE Manchester District Institution of Gas Engineers met on Saturday, under the presidency of Mr. T. N. Ritson, of Kendal, whose thoughtful and suggestive address will be found in another column. Mr. Ritson offered some satisfactory evidence, culled from official sources, of the increasing part that the gas industry is being called upon to play in the public service. Very adroitly, too, he contrived to pay a well-deserved compliment to Mr. Thomas Newbigging, whose beneficent influence upon the development of gas engineering in the wide region covered by the Institution during the past thirty years has been reflected in the prosperous history of the organization which owes more to him than to any other living engineer. There is probably no District Association of Gas Managers in the country that has helped its members more than the Manchester Institution; and it is impossible to say how much of this admirable result has been due to the unassuming paternal interest always shown towards the members by Mr. Newbigging. Mr. Ritson, like many others, has his own ideas as to how the united force of a technical society might be made more systematically useful to the members; his suggestions in this regard being reminiscent, to some extent, of the operations of agricultural societies. The question of the coal supply naturally took up a good deal of Mr. Ritson's attention. He passed in review some of the most obvious of the assigned causes of the recent rise in prices and shortage of supplies; and, though he did not express the opinion in so many words, his explanation bore the interpretation that there is nothing to justify either one thing or the other. Valuable testimony was offered to the merits of Hislop's process for restoring spent lime to its original "virtue" as a gas-purifying agent; and after this striking recommendation, the system should be much more widely taken up in gas-works. The Kendal experience of slot meters and hired-out gas-cookers is satisfactory; and Mr. Ritson is amiably envious of the Cork and High Wycombe results of similarly encouraging the use of gas-engines. The latter movement is not going ahead one-quarter so fast as it should. With a few words to show that he had not quite forgotten his old love—the home consumption of sulphate of ammonia—Mr. Ritson brought to a close an address which was excellently adapted to the audience.

The Ambition of the Rockefellers.

IT has been said that the empire of the earth is fated to pass from the shadows of the despotic dynasties and the artificialities of democratic forms of government to the reality of financial and industrial proprietorship. In due course, the world's vast population is to cease to regard geographical boundaries, and to pay taxes only to those who supply the necessities of life. Thrones are to give place to Trusts, Monarchies to vail themselves before Monopolies, Parliaments are to cede to Providers. Instead of a United States of America, there will be a United Mineral Oil Supply Syndicate. Sewing Cotton,

Soda, Salt, Soap, Bedsteads, Wall Papers—these are to be the styles and characters of the new kingdoms of the earth. An indication of the beginning of this stage of civilization was given in the financial press only last week. It was then announced, as American news, that the Rockefellers, with the aid of the Rothschilds, have just completed a Trust of greater proportions even than the Standard Oil Company, and one which is bound to exert many times the influence that oil ever did before gas and electricity entered the field. These financial magnates, it is now stated, have secured the absolute control of copper. They have acquired all the copper mines that are worth working, and all the undeveloped copper lands that are worth owning. Complaisant American financial judgment approves of this strategy. It is reported as believing that "gas is played out for lighting purposes in the cities. "Electricity is rapidly driving it to the wall, and gas com- "panies that have not the business foresight to turn to "electricity as a supplemental system, will be outstripped "in the race for business. Of course, the Standard Oil "people can very well run the two together profitably." So that is all right. In order to open up their new copper market, the Rockefellers have bought up all the electric lighting interests of New York. They have also secured the control of the New York Street Railways, and have done the same at Chicago. Why these magnates wanted to go into electric lighting and traction because they can make their own price for copper, is not apparent. So the story runs. Now, if anybody wants a copper stewpan, the transaction goes to the emolument of the Standard Oil proprietary. It seems an odd development; but why not? The ideal and the motive of financial and commercial enterprise has been changed for the whole world by the perfervid Yankee. Hitherto, the business man has gone to work to make a competence; and having secured this—or not, as the case might be—he had enough of it. He either retired from business and founded a county family, or he confessed his failure. The American has changed all that. Like the legendary sailor, having secured all the tobacco in the world, all that he wants is more tobacco. The new financier never retires from business. What could he do if he did? He wants all the dollars there are in the world; and then—more dollars. He may build himself a golden yacht, burning rough diamonds for fuel; and his riding horses may wear platinum shoes, and carry bridles studded with rubies. All the plumbing of his "up-town" residence may be in solid silver; and every paving-slab in front of it may be twice as large and thick as any other paving-stones in the wide world. But he goes to business all the same, like any office boy. The Roman tyrant is recorded to have expressed the wish that all mankind had but one head, that he might strike it off at a single blow. The mythical Rockefeller of the American newspapers is a monster of the same "stripe," as they would say. He wants to have his financial finger in every man's pie, and to pull out the biggest plums. For what? That, as the popular novelist says, is another story.

In the Interest of Just Local Government.

THE friends of sane and just government for London have good reason to be thankful for the result of last Saturday's bye-election of two representatives of the borough of Woolwich on the London County Council, which was the crushing defeat of the two "Progressive and Labour" candidates. One of these—Mr. J. R. MacDonald—is a typical example of those who, while they profess to stand for Labour, with the capital letter, have little connection with anything but the political or official party which arrogates to itself this distinctive appellation. It is not our business, as a general thing, to take notice of municipal bye-elections; but this occasion is of exceptional interest, in the circumstances. There was a vigorous drumming-up of Progressive support for the official candidates of the party, whose programme was described as "particularly "strong." Mr. MacDonald, whose "services" on behalf of "Labour" were duly advertised, was regarded as having special claims on the electorate, which is chiefly industrial. This candidate's "Labour" connections were very justly described as "legion." He had started as a City clerk himself; but "for six years he has been an honorary "member of a Trade Union; for seven he has been on the "Fabian executive, and for three years on the National "Council of the Labour Party. He used to be on the "Executive of the Women's Trade Union League, and "now sits on several Committees of the Women's Indus- "trial Council, and is a member of the Executive of the "Working Men's Housing Council." After this, it is not surprising to learn that this devoted Labour politician is a literary gentleman who writes for the "Dictionary of "National Biography." The "Municipal Journal" thought he would be a "most desirable addition to the Labour "bench on the County Council." Everybody is getting to know that "bench" pretty thoroughly. It sadly needs strengthening and freshening up by some recruits of the "horny-handed" variety, if only to leaven the old "inky- "fingered" set who profess to speak in the name of the British Workman. But the Woolwich mechanics did not appreciate Mr. MacDonald. They left him, indeed, at the bottom of a very small poll, with 1405 votes to his credit out of a constituency of 15,000. Only 7739 electors voted; and the "Independent" candidate, who was reported by the Progressive journals to have been disowned by every organization in the borough, actually beat both the official candidates of the party hollow. This striking result should encourage the advocates of good local administration, in the interest of the community as a whole, to face boldly the noisy partisans of one class, and defy those extreme men who, because they belong to the order of self-appointed wire-pullers of the political "working man," think to establish a claim to the suffrages of real working people. It is distinctly solacing to find that the Socialist, Fabian, and specialist in Trade Unionism could get only a handful of votes in all Woolwich. This result should tend to chasten the minds of the members of the dominant party in the County Council.

The Government Bill for Improving the Housing of the Poor.

ON Thursday last Mr. Chaplin brought into the House of Commons a Bill to amend Part III. of the Housing of the Working Classes Act of 1890. The measure, which was duly read the first time, deals with a matter the importance and difficulty of which have been admitted many times in the "JOURNAL." Of course, the "Daily News," which has been working up this question with laudable perseverance against the apathy of the self-styled "Popular Party" in politics, denounces the Government's "miserable little "Bill" off-hand. It is, at any rate, an attempt to do something in a direction which everybody who can read the signs of the times perceives to be the way of the next great social movement. Government Bills are none the worse, as a rule, for being styled "inadequate" by those who are a little ahead of the bulk of popular opinion in regard to their subject-matter. It is best to make haste slowly in regard to social reform; and especially is it not a bit of good to give local authorities statutory powers which they do not see the necessity of putting in force. This question of the better housing of the working-class population of towns is certain to occupy the attention and absorb the energies of the municipal authorities more and more as time goes on. During the last third of the century, town improvements have been greatly to the fore; but it is beginning to be felt that an insanitary slum in the back regions is a bad set-off to a flashy central boulevard and a people's park. So much as has already been attempted in the way of clearing out the back settlements of the towns has only served to show the elementary difficulties of the work. The first thing that strikes a would-be reformer is: What is to become of the poor people who must be turned out to enable the insanitary areas to be cleared? The existing law has gone upon the assumption that these people can be sustained in suspense, somehow, until the new homes are ready for them. The practical result has been that the clearing out of one congested area has made others worse than the first. And when the improved dwellings have been completed, the evicted population has not gone to the new nests. The Bill proposes that municipal authorities shall have a chance of establishing industrial colonies outside their own districts, in cases of need. The importance of even so moderate a proposal as this is great and far reaching. It will enable a municipality to appropriate the unearned increment in land values, and give them an economic weapon wherewith to fight the "slum lord." Hitherto, only on sanitary grounds has it been possible for a local authority to deal with the rehousing problem otherwise than as bound to the ordinary methods of expropriating owners. The consequences have been deplorable. Mr. Edmund Wilson's Society of Arts paper on his Leeds

experiences in this kind, read on the 7th inst., may be referred to for testimony as to the difficulty of making good headway under existing conditions. In speaking to Mr. Chaplin's motion, Sir Walter Foster said that a central authority, or some large local authority, should have power to supervise local areas and force local authorities to do their duty. This is queer Liberalism. Public opinion is the only effective motive power for reforms of this kind; and where it does not exist, it is perfectly idle to expect Acts of Parliament or Government Departments to do anything. What can the higher authorities do as it is, in cases where a municipal corporation chooses to ignore a high death-rate?

WATER AND SANITARY AFFAIRS.

THE long list contained in our "Parliamentary Intelli-"gence" to-day of Bills against which petitions were presented during the past week affords ample evidence that much of both the gas and the water legislation of the session will be effected only after the usual contests in the Committee-rooms of the two Houses. Our readers will, of course, understand that the list does not show the actual extent of the opposition, inasmuch as several petitions are presented against one Bill. Dealing here only with the water legislation, the two Bills promoted by the London County Council are far ahead of any of the others as provokers of hostility—nearly seventy petitions having been deposited in regard to them last week. Only one of these (from the Vestry of St. Mary, Battersea) was favourable; that body appearing to approve of the Council's purchase scheme. The second reading of both Bills has been deferred till Tuesday, the 13th prox. Another Bill which will have to encounter a good deal of opposition is that promoted with the view of obtaining legislative sanction to the formation of a Water Board for South Essex. This Bill is in the Lords; and in the Private Bill Office of that House no fewer than 25 petitions were deposited last week. A measure which will apparently encounter strong opposition is the Bill of the associated Water Companies, which, as well as the Lambeth Water Bill, has already been blocked by Mr. James Stuart, on behalf of the London County Council. The latter Bill does not seem to satisfy either the County Council or the Thames Conservancy, for Sir F. Dixon-Hartland has taken just the same course as Mr. Stuart. Regarding the Provinces, the North Warwickshire Water Bill, which proposes an extension of limits, will not have a very smooth passage through the two Houses. The Bill brought in again by Mr. Cornwallis (Maidstone) to provide for the inspection of water-supply areas has been blocked. But the honourable member was probably consoled last Friday by the statement made by Mr. Chaplin that he has a Water Supply Bill in preparation, which he hopes to be able to introduce.

At the meeting of the British Association of Water-Works Engineers in June last, the members present unanimously adopted an expression of opinion of the Water Areas Committee, that "it is essential, in the public interest, that the "water supply of the United Kingdom should be subject "to the control of some independent, duly authorized, and "properly qualified body or department." There were no dissentient voices, and no reservations or qualifications—in fact, nothing could have been more precise and definite than this declaration, and the harmony with which it was accepted. But there is evidence now that the members were rather precipitate in recording, without full and individual consideration, their adherence to the proposition of their Committee. There has, indeed, been quite a metamorphosis of opinion on the subject within the ranks of the Association, and the views of members are in a somewhat confused state. The question was once more brought before the Association at their half-yearly meeting last Saturday week, in a paper by Mr. C. E. Jones, who advocated the establishment of a National or Central Water Board, and advanced some well-defined reasons in support. We fail to appreciate any distinction between the authority which Mr. Jones desires to see instituted, and that indicated in the words "independent, duly "authorized, and properly qualified body or department," contained in the resolution adopted some eight months since. But that such a body would not now be generally —or rather we ought to say willingly—accepted by the members, is clearly revealed in the discussion which followed Mr. Jones's paper, and which is reported elsewhere. But what has brought about this transformation of views? We do not know, but have a shrewd suspicion that the circular which was sent round to the water authorities of the country, recording the opinion of the Association (the members of which are their servants) did not altogether find favour with those authorities. This is a perfectly fair surmise, as it is not at all likely that the purveyors of water, as of any other commodity, would voluntarily court a tightening of the supervisory screw. Be this as it may, the discussion on Mr. Jones's paper did not advance matters; it only disclosed the now chaotic state of the feeling of the members on the subject of control. With but few exceptions, the speakers (we are referring especially to the members of the Association, and not to the representatives of other organizations who were present) conceded that something was required in the way of control and protection; but what that "something" was, no one, excepting the author of the paper, appeared ready to exactly define. The idea of a Central Authority was almost entirely rejected; District Boards, or extended powers for County Councils, appeared to be the favoured alternative; and there were a few members who thought that the present parliamentary system, which had sufficed for their predecessors and themselves up to the present, was good enough for the future. But those who think this are those who are comfortably off, and would desire to be left severely alone. But this is not an individual question; it is a national one. And, when we remember the bitter cry for water that has gone up throughout the land during the past two or three summers, we confess to great sympathy with Mr. Jones's appeal for the proper utilization and conservation of water which is the whole nation's heritage.

While we are not prepared at the present moment to commit ourselves to any particular machinery for effecting these objects, we cannot see that there is anything to dread in Mr. Jones's proposal for some central expert authority. But, at the same time, if a Central Board is established, we should hope to see the co-operation of District Boards. Without them, things would be little better than they are now. It would, however, be essential that these Boards should be thoroughly representative of the area allocated to them; and their constitution should embrace members of all the governing bodies and existing water interests within the limits of that area. Such a Board would have, or would soon gain, an intimate knowledge of the requirements of the district placed under their charge. They could watch and confer; and they would be of material assistance in advising, and regularly supplying information to, the superior Central Board. We have not space to enter into details here as to the work which the Central Board and the auxiliary bodies would be expected to undertake, as it is well known by every water engineer. But, should any plead ignorance as to its nature, it will be found clearly stated in Mr. Jones's paper. We would, however, emphasize four of the principal questions which would come within the purview of the Central Board: (1) The proper and full utilization of all the present sources of supply; (2) the allocation of new watersheds; (3) the fostering of the development of means for impounding water which at present runs to waste at the time of heavy rains and floods; and (4) the promotion of measures for bringing about a much-needed revision of the law relating to water supply and its protection. The importance of these matters cannot be too strongly insisted upon; and it is over, and in connection with, them that a competent body, having the right of surveillance and the power to take the initiative in reformation, could, and no doubt would, accomplish great and lasting good.

The Coal-Tar Colour Industry in Germany.—According to recently published reports of the German Government, there were in Germany on July 14, 1898, 25 factories of aniline and aniline dyes, and 48 establishments which besides dyes were occupied with the various products from the distillation of coal tar, picric acid, phenic acid, &c. The exports are estimated to be five times greater than those of any other country. In 1883 these were: Alizarine, 4008 metric tons; aniline oil and salts, 663 metric tons; aniline dyes and other coal-tar colours, 3819 metric tons. In 1898, the figures were 9321, 12,360, and 19,712 tons respectively. It will thus be seen that the exportation of alizarine has more than doubled, that of aniline oil and salts has increased nineteen times, and that of aniline dyes five times since the year 1883.

ESSAYS, COMMENTARIES, AND REVIEWS.

THE STEVENSON MEMORIAL.

At a Meeting held at the Westminster Palace Hotel on the 2nd inst., when the views of a large number of sympathizers were considered, it was unanimously resolved that the proposed memorial should take the form of a tablet, recording in suitable terms the death of Mr. Stevenson, and the position he held in the consideration of his professional colleagues, and that any surplus arising from the fund should be handed to the widow to be devoted to the advancement in life of the younger children. The following were appointed a Committee: Mr. J. Ferguson Bell, Mr. Thomas Goulden, Mr. George Livesey, Mr. Thomas Newbigging, Mr. R. G. Shadbolt, Mr. Corbet Woodall, Mr. Walter King, *Treasurer*, and Mr. H. E. Jones, *Hon. Sec.* Subscriptions as below have either been received or promised; and the Hon. Secretary (Mr. H. E. Jones, of the Commercial Gas Company, Stepney, E.) will be glad to be advised without delay of further contributions.

Contributions.

	£	s.	d.		£	s.	d.
John Aird	5	5	0	H. E. Jones	3	3	0
Joseph Aird	5	5	0	H. H. Jones	2	2	0
T. Berridge	1	1	0	F. H. Jones.	2	2	0
J. Ferguson Bell	1	1	0	S. H. Jones.	1	1	0
J. Cash	3	3	0	Walter King	3	3	0
"Civil Engineer"	10	0	0	William King	2	2	0
Geo. Dawson	10	0	0	Geo. Livesey	3	3	0
A. Dougall, jun.	3	3	0	Chas. Meiklejohn	2	2	0
W. Foulis	2	2	0	Thos. Newbigging	2	2	0
T. Goulden	2	2	0	R. O. Paterson.	2	2	0
W. Doig Gibb	2	2	0	J. H. Rowbotham	5	0	0
Jno. Hammond	1	1	0	R. G. Shadbolt.	2	2	0
J. W. Helps	2	2	0	W. A. Valon	3	3	0
J. Hepworth	3	3	0	W. Arthur Valon, jun.	2	2	0
W. R. Herring.	2	2	0	"Westminster"	2	2	0
Chas. Hunt	3	3	0	Corbet Woodall	5	5	0
P. C. Hunt	1	1	0				
					£100	12	0

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 558.)

The Stock Markets have brightened up considerably under the more favourable war news; and in nearly all departments prices show fair improvement. Business has been stimulated, though dealings are still restricted, pending the receipt of definite news as to the military operations in the Orange Free State. As regards investment stocks, there has been very little business doing in the best class. Consols are firmer, on the better prospect of cheaper money; and they are now 3 per cent. above the lowest points of the year. Indian sterling loans are also fractionally up; but Colonial securities remain featureless. Gas stocks have also been apathetic. Even Gaslight ordinary has been extremely quiet; only one official marking being recorded on one or two days. There is no change in the value of the stock; but the tone of the market is firm. There was a little dealing in the secured issues; and the 3 per cent. debentures are 1 higher. The stocks of the other Metropolitan Gas Companies were also very quiet, with occasional dealings in South Metropolitan and Commercial. Respecting the Suburban group, Brentford issues (which are quoted *ex div.*, as well as several other stocks) have shown renewed weakness—in fact, they have drooped since it was known that there is to be a further issue of £46,875 of 4 per cent. debenture stock next month.* The price of the previous issue of this stock has fallen five points. Among the Provincial stocks, there has been no alteration; while there was only one change in the Foreign group—viz., a rise of ¼ in River Plate. Some business, however, was transacted in European, Imperial Continental, and Monte Video. Water stocks have also been neglected—very little business being recorded. But New River debentures are 2 up, and West Middlesex ordinary 1.

Concerning the daily operations; Monday was very quiet; the only changes being in secured issues. Alliance and Dublin debentures rose 3 to 110-113; while Crystal Palace preference fell 5 to 135-140, and Brentford 4 per cent. debenture, 8½ to 115-120. A little business was recorded in Gaslight at 106¼, South Metropolitan at 134½, Imperial Continental at 217½, Alliance and Dublin at 21¾, European at 21½, and Bombay at 6½. On Tuesday, Brentford debentures recovered 3 to 118-123; but there was scarcely any business recorded, except in Gaslight between 105½ to 106½. Commercial changed hands at 308-309¾, Imperial Continental at 217, and European at 20⅞. Wednesday was a very dull day, with very few dealings, and no change in values. Thursday was also quiet, though a little more business was recorded in Gaslight ordinary between 105¾ and 106½; the only change in prices being a rise of ¼ in River Plate. Friday was another featureless day, with very little business recorded. On Saturday, Gaslight ordinary changed hands at 106⅞, and South Metropolitan at 136.

* We have since learned that the proposed issue of debenture stock has been withdrawn by the Board.

ELECTRIC LIGHTING MEMORANDA.

The Lesson of Leicester—The Policy of the Corporation—The Wisdom of Mr. Colson—A Peculiar Business—Searching Questions.

It is one of the amiable delusions of the more narrow-minded sect of electricians that electricity supply and gas supply cannot be satisfactorily worked together. Like most other human errors, this has its superficial and temporary conveniences for certain purposes. This is why it is kept alive. In the case of a municipal electric lighting department which does not appear to be wanted by the public, and consequently does little business, the discredit that would otherwise fall upon the electrical prophets who promised that it would return a handsome balance for relieving the local rates is avoided if the excuse can be made that the department is controlled by the gas committee. Usually, this explanation is regarded as sufficient; and the electrical journals are not always above the weakness of accepting it, and asking, with a fine show of indignation, what the townspeople can expect from such an unholy alliance. It is for this reason that we draw attention to the noteworthy case of Leicester, as exhibited by the evidence given by the Town Clerk (Mr. J. Bell) and Mr. Alfred Colson at the Local Government Board inquiry reported in last week's "Journal" (p. 487). It would be superfluous to say here what gas engineers think of the Leicester Corporation Gas Engineer in his original capacity; and there is no higher praise to be awarded to any electrical engineer than to say that Mr. Colson in this capacity has done the electricity supply for Leicester as well as he had already done the gas supply.

It is desirable to rub this lesson of Leicester well in to the electricians and their partisans and apologists in other and less happy localities; and it would be only fair if the electrical journals would take the opportunity offered by this inquiry to make the *amende honorable* for their past sins against the light. Meanwhile, let us see what the story of Leicester is. The Corporation have applied for an additional electricity loan of £100,000, of which upwards of £86,000 is required for extensions, and the balance is to repay an excess of capital outlay since the previous loan was obtained in 1897. The very good and sufficient reason given for this excess, and the further contemplated capital expenditure, is that the business has grown rapidly since it was started in 1894, and is still growing as rapidly as ever. In order to stimulate the demand, the Corporation reduced the price of current from June last to 4d. per unit for lighting, and 2d. per unit for power. This does not look much like keeping back the electricity department for the sake of the gas undertaking! Having thus given the venture the best possible recommendation to the public, the Corporation mean to lay out the works and distributing plant on a proper scale for ensuring an effective supply, so far as good plant and enough of it will answer the purpose.

There is to be no dodging the consumers by trying to get revenue from half as many lamps again as the plant can supply. This winter Mr. Colson has had a generating capacity at the central station equal to 1400 kilowatts, all told; or 1050 kilowatts allowing for one spare machine. The boiler capacity has been a little short of this. The maximum demand for the winter has been 880 kilowatts; leaving the narrow margin of 170 kilowatts. This is as close to the wind as Mr. Colson wishes to go; and in view of the calls for fresh lamp connections in the area of supply, he is going to bring the capacity of the station up to 3400 kilowatts, with boiler power to match. Marvellous to relate, the capital outlay up to June last was only £55 per kilowatt. At the end of last year, the "Electrician" gave it at £48·6 per kilowatt, which must surely be the best "record," with a positive excess of power. Mr. Colson may be allowed the little boast he indulged in before the Inspector, when he spoke of the excellent position of the undertaking in respect of capital burden, and claimed that the quality of the equipment of the station was second to none in the country. Indeed, most of the ingenious gentlemen who profess and call themselves electricians might be recommended to go to school with this Midland gas and electrical engineer.

It is remarkable also that the Leicester electricity supply business is of anything but an eligible character from the point of view of the professional gentlemen who are fond of talking about "load-factors." The supply is laid on for the benefit of the townspeople; and Leicester being a manufacturing place, many patrons of the electricity department only use the light for a very short time in the day. Consequently, according to the "Electrician's" analysis, the revenue per 8-candle lamp connected is one of the smallest on record, being about 4s. 9d. per lamp for the past year. The Corporation do not mind. They know their customers—in fact, the members of the Corporation in many cases are the customers; for Leicester is a town where the local government is wholly in the hands of men who have the largest and best of interests in doing what they think best for the town. That is to say, there is not one set of townspeople carrying on the business of the town, supporting the Corporation departments, and paying the rates, and another set of people in municipal office—as is the case in London, and some other places. We do not mean to imply that the municipal policy of the Leicester Corporation in all matters is necessarily commendable on this account. Far from it—the "Journal" has always held, for example, that it would be better policy for the town to sell gas at cost price and so

encourage local industries by this means, instead of making the Gas Department a municipal milch cow.

For the purpose of the present argument, however, this very action of the Leicester Corporation, as regards the sale of gas, sets in a most favourable light their treatment of the Electricity Department, which is actually run at cost price. Users of electricity are given a decided and material preference over the gas consumers; and for six years they have been supplied at a loss. Only during the current year will the revenue account of the Electricity Department clear itself; and then there will be the depreciation to provide for, which has not yet been touched. From all this, it appears that the fanciers of electricity in Leicester have every reason for thankfulness that their wants have been catered for by the Gas Committee, over and above the special advantage that the town itself has derived from the conspicuous ability with which Mr. Colson has tackled his latest extra responsibility. The Corporation, it should be noticed, will have nothing to do with fancy methods of charging for current, the price per unit being uniform, without discounts; and with all this, the increase of gas consumption is after the rate of 12 per cent. for the year. It almost looks as if the Gas Committee were anxious to shunt some of their factory lighting on to the Electricity Department—wheels within wheels? But this is a matter that cannot be gone into here.

OUR COAL RESOURCES AND CONSUMPTION—A RECONSIDERATION OF SOME ESTIMATES.

(*Continued from p.* 463.)

We have now to recall the estimates made in 1865 by Professor Jevons, and in 1871 by the Coal Commissioners, of the probable depletion of the coal resources of the kingdom in the thirty years just completed; to compare those estimates with the actual figures; and to see to what extent the result of such comparison modifies the calculations made by the experts in the sixties, as to the probable further duration of our coal supply.

Jevons founded his alarmist calculations upon the basis of an assumed constant annual increase of 3½ per cent.; the starting point of his estimate being the output in 1861—namely, in round figures, 83,600,000 tons. On this assumption, the coal supply, as he estimated it, would only have lasted a little more than a hundred years from the commencement of the calculation—namely, 1861. More than a third of that period has now elapsed; and we are able to judge of the accuracy of the forecast. Upon this basis, the total quantity of coal raised in the thirty years, 1870 to 1899 inclusive,* would have been 5683 million tons. The actual aggregate tonnage raised was, however, only 4780 millions (assuming the output for 1899 at 212 million tons); so that the total consumption was over-estimated by Jevons by about 20 per cent. The average annual increase for the period in question was, in fact, only some 2¼ per cent., as compared with the 3½ per cent. which Jevons assumed in his calculations. The difference between his estimate and the actual, will, it is to be observed, widen with every year; for, while he assumed an output for 1899 of 309 million tons, and that this figure would increase steadily by 3½ per cent. per annum, the actual output last year, according to the latest estimate, was but 212 million tons. And, for reasons into which we will enter presently, we think it is hardly probable that the rate at which the output has increased during the past thirty years—namely, 2¼ per cent.—will be exceeded, or even maintained, in the future.

The Coal Commissioners embodied in their report three estimates of the probable duration of the coal supply of the kingdom, based on as many different hypotheses, each of which assumed the stock of coal to be the 146,480 million tons estimated by the Commission to be obtainable from mines not exceeding 4000 feet in depth. The first assumed that the annual consumption at the time of their inquiry would not increase in the future, on which basis the supply would have lasted 1200 years; an estimate to which little space was devoted in the report, and to which we need give less. A second method of calculation (one apparently quite arbitrary in character) took for its basis a constant annual increase of 3 million tons, on which assumption the coal supply would last until the year 2146. Although this estimate appears to have been formed chiefly by rule-of-thumb, it has up to the present proved remarkably correct—which is not infrequently the way with rule-of-thumb calculations made by an expert. Taking the basis of an annual increase of 3 millions upon the output of 1869, the total consumption for the following thirty years would have amounted to 4605 million tons. It was actually 4780 million tons, resulting from an average yearly increase of 3⅓ million tons. The output for the year 1900, on the basis of a 3 millions a year increase, would be 200 millions. It is doubtful whether a rate of increase falling from 1½ per cent. now to 1 per cent. in 33 years' time, and continuing steadily to decrease, is a sufficiently high estimate for the future; but no considerable modification need apparently be made in the probable period of duration calculated therefrom—viz., 247 years from now.

It is, indeed, we think, certain that the consumption of coal in this country will not continue to increase at the average rate at which it has mounted up since 1869—a view which is supported by the fact that, while the aggregate consumption during the period 1880-9 was 26½ per cent. greater than that during the previous ten years, the total consumption in the decade just ended was only 18½ per cent. higher than the output for 1880-9. That the rate of increase in the consumption of coal must, as time goes on, more nearly approximate to the rate of increase of the population (which grows steadily by about 1·1 per cent. per annum), appears to us self-evident. The past half-century has witnessed a wonderful expansion and creation of industries involving the consumption of coal. We have already referred to some of them; and we do so again, in order to bring out the point that the development of many of these industries has now almost arrived at the stage when their growth will be much more nearly coincident with the growth of the nation than during recent years.

To mention a few considerable instances. The railway system of England is now, but has only in recent years become, practically complete—of course, speaking broadly—and the extent to which travelling facilities can be provided for the people, and availed of by them, is reaching its limit. Iron ships have almost entirely superseded wooden ones, and steam-ships replaced sailing vessels; so that the increase in the iron and machinery required in shipbuilding, and the fuel necessary for the supply of motive power, will in future be caused solely by the increase in shipping. Again, the sales of gas, although—fortunately for the industry—not showing so meagre a growth as by 1·1 per cent. per annum, depend mainly for their increase upon the displacement of coal itself as fuel. A still further cause of the increased consumption of coal in recent years has been the steady transference of population from country districts to the towns and cities; the town dweller being a much larger consumer of coal than the rustic. This migration cannot continue—nor is it, in fact, now proceeding—at anything approaching the rate at which it has taken place in the past fifty years. The agricultural districts cannot well become much more depleted than they already are.

It is, then, as we have said, apparent that, while the consumption of coal will continue to grow, it will be at a diminishing rate of increase. Were it otherwise, indeed, the outlook would be a dark one; for, while the forecast of Jevons—that, at the rate at which he estimated the consumption would expand, the stock of coal in this country would only last until about 1965—was too pessimistic, the result of a substitution of the average percentage of increase during the past thirty years (2¼ per cent.) for that assumed by Jevons (3½ per cent.), would only postpone the date of the exhaustion of our available coal supply, as estimated by the Royal Commission, until the year 2025. This, too, after adopting the much higher estimate of the present stock of coal made by the Commissioners, in the place of that adopted by Jevons. That Jevons was hopelessly wrong in estimating a perpetual annual increment of 3½ per cent. in the output, the Commissioners gave good reasons for believing; and the experience of the subsequent thirty years conclusively proves it. Time will, we venture to think, as certainly justify a rejection of 2¼ per cent. as a constant factor.

The third method of calculation adopted by the Commissioners was founded upon an estimate of the population of Great Britain, and of the quantity of coal consumed per head, in the years then to come. To the quantity so estimated for home consumption, an addition of 12 million tons per annum was made for estimated exports. The result of this calculation was to give the coal-fields a life of 360 years, dating from 1870—that is to say, they would be worked out by the year 2230. Upon this third basis, so far as it is possible to exactly determine the method of calculation (into which the Commissioners did not enter in detail), the consumption for the thirty years just past would have been 4463 million tons, as against an actual output of 4780 million tons. The difference lies wholly in the export tonnage. The Commissioners estimated a home consumption of 4103 million tons; whereas the actual quantity consumed was 3905 millions. But, while the Commissioners only reckoned upon the exports remaining a constant figure, equal in the thirty years to 360 millions, this branch of the coal trade—as we have had recent occasion to remark—has developed rapidly; the total for the period under consideration amounting to no less than 880 million tons, and the present annual export being somewhere about 54 millions. Of this quantity, rather more than 12 million tons—the total tonnage estimated by the Commission to be exported—comes under the heading "Coal shipped for use of steamers engaged in foreign trade," which thirty years ago only amounted to some 3 million tons. The growth of foreign trade, and of steam navigation, was evidently not foreseen by the Commissioners. A correction of 80 to 100 years in the length of life calculated by this method for the coal-fields is, we think, required to adjust for this under-estimate of the export trade—a correction which would bring that life down to practically the same as that estimated by the Commissioners' second method of calculation—namely, 247 years from the present time.

The Commissioners further reported that, should the quantity of coal estimated by them to lie in the known and concealed coal-fields at greater depths than 4000 feet be obtainable, the supply so afforded would be equal to a further 48 years' consumption. The probability of such coal proving accessible is,

* We deal only with the figures for the period commencing with 1870, a that was the first year dealt with in the estimates of the Royal Commission. For the preceding eight years the difference was inconsiderable, the output being estimated by Jevons at 757 million tons.

however, so extremely small that, as a national asset, the estimated quantity cannot be valued at a single penny. Long before the country is reduced to such straits for fuel as the attempt to work at anything like 6000 feet below the surface would indicate, coal will be imported from America.

It is to be observed that, in none of the estimates that we have quoted, is any allowance made for the fact—which, however, we do not imply was altogether overlooked by the authors of the forecasts—that the output of coal will tend to diminish, not to increase, so soon as the more-easily accessible seams have been exhausted. The estimates are all founded upon the assumption that it will be possible to raise all the coal between the surface and a depth of 4000 feet, and that such coal will continue to be mined at an increasing rate each year until it is all gone. But the possibility cannot be ignored that the cost of obtaining such quantities as lie comparatively near to that limit may prove so great as to admit of the successful competition therewith of imported coal. One factor that tends considerably to increase the cost of raising deep-lying coal is the charge for capital—the original outlay being so great. As an instance of this may be mentioned the sinking of the Monkwearmouth pit—one of the deepest in the country—which required twenty years' expenditure of labour (and therefore capital) before any coal was brought to the bank for sale. But even if the cost of working the deeper mines do not prove prohibitive, the price of coal will certainly rise in proportion to the increase in the expenses of mining, until that price materially checks the consumption. Our coal-fields will, in fact, die a lingering, not a sudden, death. There will be no day arrive when the whole industry and trade of the country will come to a sudden halt because the collieries—hitherto producing, as, according to the estimates with which we have been dealing, they would have been producing, some millions of tons daily—have come abruptly to the last ton in the last seam. What will in truth happen as the time approaches when, were the same wheels to revolve for ever in the same way as in our own time, the coal supply would become exhausted no man can now foresee; the whole industrial and social machinery of the world may have been completely changed before then. Of one thing, however, we may well rest assured. So far from the present temporary scarcity of coal being due, as has been suggested—in one at least of the organs which undertake to "inform" the general public on questions of the day—to the arrival of the "coal famine" predicted by Jevons (who did not himself anticipate an appreciable scarcity before about 1920), the quantity of coal remaining in the mines of this country at the present day, and likely to be accessible, will supply all the requirements of the kingdom during the twentieth century, so far as it is possible now to estimate them. The only qualification that might, perhaps, be attached to that assurance is one suggested by the fact that we have, at present, no official estimate of how much of the coal lying in the strata of moderate depths exists in easily (and therefore cheaply) worked seams, and how much in seams so situate or so thin that the cost of winning the coal will be considerably higher than the present cost of production. Upon this point more information is desirable, and should not be difficult to obtain. The present is a time when the authorities might well be approached with a view to the appointment of a Committee of Experts to determine and report the actual facts of the case. Those facts must have an important bearing upon the possibility of this country maintaining its grounds in the commercial competition with other countries—in particular with the United States. For the cost of fuel is of vital importance to almost every industry, but especially to our great iron and steel trades. As Solon said to Crœsus, when he ostentatiously displayed his gold, "Sir, if any other come that hath better iron than you, he will be master of all this gold." Coal is, moreover, a prime necessity to our "first line of defence"—the navy. But until inquiry shall determine the contrary, we shall continue to hold the opinion that there need be no anxiety in regard to the quantity or cost of our coal supply for many years to come.

A NEW PRINCIPLE IN MACHINERY DEPRECIATION.

THANKS to the courtesy of Professor Robert H. Smith, whose previous work upon the subject has been noticed in the "JOURNAL" (Nov. 21, 1899, p. 1240), we have received an advance proof of an article on the Depreciation of Machinery, which is to appear in the forthcoming number of "Feilden's Magazine." It is a matter for thankfulness that just now, when so many local authorities are bent upon going into trade with the money of the ratepayers, so competent and independent a teacher as Professor Smith should arise to expound the true doctrine of industrial profit. Not, of course, that any amateur of municipal trading is bound to pay the slightest heed to any teaching of the kind, even if he should happen to get to hear of it. British local authorities are seemingly at complete liberty to keep their profit and loss accounts just as they like, and vote that they mean anything they choose. Only in this way has it been possible for municipal electric lighting to make the headway it has done. There is not the smallest doubt about this; but if an illustration in support of the contention is called for, it will be found in the financial history of the St. Pancras Vestry electric lighting undertaking. The first Engineer's estimate of the working of the proposed scheme provided for a reasonable allowance for depreciation. This allowance has never yet been made, although the financial responsibilities of the Vestry in this regard have very greatly increased.

Nor is the study of depreciation something for local authorities only to take in hand. No director of a joint-stock manufacturing and industrial company can divest himself of the responsibility for taking account of this factor in the life of the business. Every honest director should be able to satisfy himself as to the answer he could give to the question whether the dividend is being paid out of profits or out of capital. This is where the criticism of such experts as Professor Smith comes in. He may or may not be absolutely right; but he has tied himself to the proposition, of which he is the author, that "the calculation of the correct charge for depreciation is quite capable of definite theoretical statement." He is careful to make the qualification that it may be doubtful whether in any individual case all the data needed for the theoretic calculation are ascertainable, or can be estimated with a usefully close approximation; but a good deal more might, and should be, done in this regard than is attempted in many instances.

What is the meaning of the word depreciation, as applied to a machine? Clearly, as Professor Smith says, it is the change in the capitalized present value of its nett earning power, taking into account the probable duration of its remaining life. In finding the nett earning power, all the money burdens it has to carry must be brought into the reckoning. This is simple enough; but at the very outset Professor Smith shows that there is a difference between the value of a machine and its actual cost. Machinery is worth its book cost, *plus* something for the intelligence employed in its selection and placing. If a machine is worth no more than the amount of the maker's invoice, added to the cost of fixing, why did the purchasers buy it? Accordingly, Professor Smith lays down the somewhat startling rule that in the case of extensions of a well-established works with certainly assured prospects, nothing but recognized custom prevents the writing-up of the value of a new machine by the inclusion of something for its profit-earning value. This plea is open to the criticism that a badly-selected machine ought to be valued at less than its actual cost; and who is to decide?

The point, however, is well taken. It also deserves much more profound study than we can give it here, or than Professor Smith can spare for the time being. It suggests a fresh principle for guiding the selection of machinery and helping to distinguish the most profitable choice. Two cranes, two pumps, two labour-saving appliances, may be priced the same, and have the same expectation of life; but which is really the more profitable? Professor Smith only touches upon this question, and goes on to describe how the actual value of a machine is to be found at any period of its life. This determination is independent of whether the capital value is going to be used up and destroyed as the machine grows older, or whether it is to be preserved intact by any form of repayment sinking fund. The problem of the present value of machinery is dealt with by Professor Smith on the convenient assumption that it has been bought and erected with borrowed money, at a certain rate of interest, repayable at the end of the life of the machine. The nature of the computation involved in this assumption is made clear by the accompanying tables and diagrams.

The calculations tend to become complicated as the various considerations of annual earning power, ultimate value, and so forth, are followed up. The next elaboration offered is the distinction between intrinsic and extrinsic values. The former changes only in consequence of change in the machine itself. The latter changes also in consequence of change in external circumstances, such as the selling price of the articles produced, the prevailing interest obtainable from investments, first cost, and efficiency and economy of new patterns of similar competing machines brought into the market. These respective ideas are easily grasped. Speaking broadly, they merely indicate the difference between old age and obsolescence. A certain tool, for example, merely grows old and wears out, when it can be replaced at about the same cost by a new one quite as good and useful. Another, perhaps, cost more than it could be replaced for at any time; or it is less valuable than it was because it no longer makes what is required. In the latter case, of course, its value is *nil*. The discovery of this deficiency is one of the secrets for which trading concerns must always be prepared. Much of the weakness of old-established firms is due to their possession of old plant which they had far better be without. Professor Smith grapples these important considerations with a power of mathematical analysis that inspires respect, even in those who must stand aghast at his formulæ.

We have no hesitation in stating that Professor Smith's application of algebra to the determination of the every-day commercial data which he has in view throughout this investigation, is at once a revelation of the power of mathematics and a justification of the science for engineering students. Naturally, as in most other exhibitions of mathematical analysis, one is occasionally struck with the simplicity and obviousness of the conclusions reached by such elaborate processes. Thus, Professor Smith claims to have exhibited very strikingly how much more damaging is an adverse change of external conditions in the early life of a machine when most of its earning work lies in the future, than is the same change occurring at a later date when its

utility has been nearly used up. But this is only another way of saying that it is much worse for a piece of plant to become obsolete early than late in life, which scarcely requires to be demonstrated.

One of Professor Smith's particular claims to renown, we understand, consists in his having been among the first to assign its due importance to the case of "antiquation" of pattern due to the introduction upon the market of new and improved machines. Meritorious novelty in new machines may lie in (1) cheaper prime cost for the same productive capacity; (2) improved quality of output, commanding a better price in the market; (3) saving of workmen's wages; and (4) economy of room and power. There may be others; but this category of advantages shows the road to the scrap-heap for the old patterns. What is the owner of the old plant to do in the circumstance of finding his appliances outclassed? That is the question of questions for the manufacturer. If he is a municipality, he will settle the matter off-hand by pleading the privileges of his monopoly, and warning the improved product off his preserves.

The paper brings out another calculated result of great and far-reaching importance—namely, that the yearly depreciation increases as time goes on and the end approaches. The general notion is that a fair charge for depreciation should decrease. Professor Smith believes that this notion is based upon the idea that the depreciation allowance should be a constant percentage of the remaining value; and, therefore, as the remaining value is always diminishing, so does the depreciation. This is an error. There are purists in industrial finance, as Professor Smith remarks, who hold that a new machine should be most heavily depreciated immediately after it is purchased, on the ground that it would never fetch so much money at a sale. But this view, as he explains, errs in taking the selling value instead of the working value. Machinery is bought for use, not to sell again. Indeed, as Professor Smith started by observing, new machinery ought to stand a going concern in more than its invoice-cost. There are mechanics, on the other hand, who hold that machinery goes on for a long time without deteriorating at all, and then breaks up in a comparatively short time. The paper now under notice is an attempt to put upon a scientific basis the feelings of this last set of friends of machinery by dissociating the idea of depreciation from the first cost, and basing the allowance upon the working value—that is, the worth of the machine to the owner during its whole life. Professor Smith gives up as hopeless the task of proportioning depreciation to first cost. He has tried, but failed, to base an intelligible system of depreciation upon this connection. It is not what a machine costs, but what it is worth to the user, that determines the amount of depreciation. That this consideration is speculative does not affect the principle. There is a very great deal in this *dictum* of Professor Smith; and, on the other hand, the author is not blind to the practical drawbacks to the application of his method. That it is deserving of particular study by all those who have the responsibility of administering industrial undertakings involving the use of much perishable machinery and plant, will not be disputed. The more one thinks about it, the stronger the conviction grows that Professor Smith is right in the main. Still, as a matter of fact engineering works are not depreciated in this way. It would be a bad look-out for the enterprising Metropolitan Electric Lighting Vestries if the London County Council were to follow Professor Smith's advice and require the plant provided out of redeemable capital to be insured on this scale. It would be a good thing if Professor Smith would take the bull by the horns and treat the Association of Municipal Corporations to a dose of his purgative mathematics—exhibited, as the faculty say, on the *corpus vile* of the Edinburgh, or some other notable municipal electric lighting undertaking. At present this exercise is, unfortunately, all in the air; and abstract reasonings break no bones.

SOME VIEWS OF ENGINEERING TRAINING.

Sir W. H. Preece recently entertained the Glasgow Association of Civil Engineers with a carefully-prepared discourse upon the "Functions of the Engineer," the text of which has been published in many scientific and technical journals. A remarkable feature of this address was an accompanying chart, composed after the pattern of a genealogical tree, which showed at a glance the author's idea of the branchments of the various specialized applications of engineering from the root-form of the science. We do not propose to reproduce this chart here, as we have no room for it, and it is composed for the most part of descriptive titles of engineering specialities with which we have small concern. Besides, many of our readers will have already seen it elsewhere. It is an ingenious way of displaying the great craft of engineering in a certain order; but it might be objected by a critic inclined to be captious, that there is not much to be learnt from it after all. We do not wish to be misunderstood as depreciating this particular exercise of Sir W. H. Preece's talents, which certainly does him credit. But the chief and the proper object of classification is instruction, and mere enumeration is not of much service. This chart, for example, starts from the originating term "Engineering." Immediately it branches into the three categories of civil, military, and naval. These in turn have their detailed developments, which in some cases result in the collection under one class of some heterogeneous entries. Thus, civil engineering is divided into domestic, municipal, interurban, national, international, and universal classes. The first of these subdivisions includes lighting, ventilation, warming, and water-supply. The second, or municipal class, embraces electrical energy, gas, public lighting, smoke-prevention, and drainage. The national class comprises chemical industries, manufacturing processes, the management of estates, and refrigeration. Sir W. H. Preece must have been considerably exercised over his classification, which is somewhat arbitrary. Oddly enough, there is no special entry of engineering works; and electricians generally will not be wholly content to see themselves relegated to the class of municipal workers.

It might be objected that the classification adopted is highly artificial, inasmuch as it does not proceed upon the same lines as those naturally followed by engineers in preparing themselves for their special place in the ranks of the profession. This is a matter of general preparation to begin with, followed by particular cultivation of the individual genuis, or the bending of personal talent to the requirements of the opportunity, or, as it is commonly called, the "opening." For enlightenment upon this order of considerations, it is necessary to leave the chart and turn to the text of the address. The root notion of the engineer is that of a man who knows more about, and can do more with, the material forces and forms of the earth for the attainment of useful ends than any man who is not an engineer. The compass-needle of the engineer is therefore common-sense, controlled by foresight, insight, and hindsight. Some of this quality can be acquired; much of it must be innate. All engineering work, of whatever kind it is, must show systematized common-sense as its predominant character. That is a product of mother-wit, impressed into a particular service by knowledge, and applied by capacity.

Those who desire to become engineers must possess as a groundwork, as Sir W. H. Preece declared, a broad, solid, general education, "not specialized in any way until the pupil has reached the stage when he can work and think for himself." A sound, liberal schooling must go first. A great deal of discussion has raged over the all-important questions of the age to which this school-period should be extended, and the character of the instruction and training that should be given to boys before they can think for themselves. Many ardent educationalists clamour for a considerable prolongation of the elementary school age; but, as Professor Ripper, of Sheffield, weightily observed the other day, purely elementary schooling is apt to be vitiated, when kept on too long, by the application to all the boys of the purely scholastic measure of ability. The Board Schools have succeeded in demonstrating that if every lad regarded by the schoolmaster as "clever" is not to be attracted to the teaching or clerical employments, he must not be kept at books and pen and ink too long. At the psychological moment when boys cease shirking their "lessons" and performing their "tasks" perfunctorily—when nascent ambition and the desire to be doing something show that the adolescent mind is awakening—is the time for putting boys to their work. Many of the most useful workers have only been saved from becoming mere pedagogues or clerks by their having happily wasted their time at school.

This is what Professor Ripper says on the point: "An idea is beginning to dawn upon us that perhaps, after all, there may be, among the very large majority of boys who are never among those selected to receive any special training to pass University examinations, and who have no special aptitude in the direction of acquiring book knowledge, much real ability in other directions—in fact, that they may be, as it were, a kind of unworked mine of possibilities and resources. Hitherto, they have been looked upon as the wasters of the school; but it is almost certain that the great inventors and mechanicians of our time have not usually come from the class of boys who are looked upon as the most successful students. Usually, the 'clever boy' is the one who, by his ability in the particular direction by which the schools measure ability, succeeds in *escaping from the workshop* and in doing, as he would consider, better for himself by obtaining other employment." These words are welcome as showing that, at last, a man eminent in the teaching profession has appreciated one of the objections taken by the industrial public to an excessive extension of the elementary school age in the case of children with their living to get. If it could be proved that the boys who remain longest and attain the highest distinctions in the elementary schools made the best workers afterwards, the "popular error," as it is commonly stigmatized by superior persons, that over-schooling spoils children for work, would speedily disappear.

It is not merely those who are concerned for the future of the handworkers of the industrial population who need be on their guard against the pedagogue. Sir W. H. Preece joins in the warning that the school age must also be a period for the cultivation of the powers of observation, the systematic training of the memory, and the encouragement of the exercise of thought. This is a little vague; but, of course, the speaker was not giving out a syllabus. He did, however, protest against the school teaching of "science," so called, which is commonly rubbish. In truth, there is now a reaction against the fashion of the last twenty years, of trying to make schooling "interesting." It is recognized that all the durable conquests of the school age—reading, writing, arithmetic, the habit of attention, and the practice of obedience—are not amusing in the winning. They are only

to be gained by sheer drudgery, and at the end of a stick if need be. Where is the practising engineer who has not had occasion to complain of the bad writing, stupid spelling, and lack of "grounding" on the part of the products of modern schooling with whom he is constrained to recruit his office and responsible junior posts?

When it comes to learning engineering science by youths who have passed the school age, specialization begins. A gift for mathematics can be cultivated, a love of mechanism instructed, and a taste for chemistry indulged—all with the strictest reference to the requirements of the chosen career or the fortuitous opening. Over and above all specialities stand the great realities of engineering practice—the knowledge of men and materials, of the value of labour and goods, and the bearing of natural forces. These cannot be acquired in colleges; nor, on the other hand, can other equally essential portions of engineering equipment be picked up in shops and works. Broadly speaking, the college professor knows what ought to be done; the works foreman knows how to go about it. The engineer needs to know it all, and more. He must be able to bring an acquaintance with finance and common business to bear upon the conclusions of the drawing office and the possibilities of the workshop. Sir W. H. Preece says in this connection: "The civil engineer of eminence has not only to know thoroughly the science, but to conduct the practical operations of his profession. The lives of human beings are entrusted to his designs. People have faith in the safety of his ships, long tunnels, bridges, and railway trains. He is called upon to advise on policy, to deal with commercial management, to act as arbitrator or judge in many important intricate judicial cases, and to appear in courts of law and committee rooms of Parliament as an expert witness. The mental qualities of the engineer must, therefore, be of the very highest order." But all this will be nothing unless accompanied by personal integrity, as regards the world; and as regards the contentment of the man himself, by the resources of a broad, cultivated mind, and a spirit strong enough to bear disappointment and delay with equanimity, and success with modesty.

So much for the personal applications of Sir W. H. Preece's address. Curiously enough, his classification of the applications of engineering science to the use and convenience of man amply bear out our contention of last week (*ante*, p. 464) that "most engineering is, in the end, adapted to the service of the mass of the community, and tends to cheapen common life and to ease it for the poor." The agreement is most conspicuous in the category of municipal engineering. Next to "Gas," in Sir W. H. Preece's list, comes "Housing the Working Classes." One other comment may be offered on the text of the address. Sir W. H. Preece observes that the first known picture of a man "depicts him as a hunter." He is that still; only, in the case of the engineer, the game has been changed. The engineer has to "hunt for the pot" first, like every other man; but he has the satisfaction of knowing that as a rule the world profits by his exertions even more than he does himself.

ELECTRICITY GENERATION IN BULK—THE SCHEMES IN PARLIAMENT THIS SESSION.

In enumerating recently the companies applying to Parliament this session for the sanctioning of schemes for electricity generation in bulk, mention was made of the Tyneside Company, and coupled therewith was the name of Mr. A. A. Campbell Swinton, the electrician. In the "Nineteenth Century" for February is an article by that gentleman, showing cause why Parliament should grant the powers applied for. The article is entitled "Electrical Engineering and the Municipalities;" and it effectively shows up the "dog in the manger" policy of the British municipalities and its effect in handicapping the development of the electrical industry in this country.

Mr. Swinton's indictment of the municipal authorities runs on these lines. It is a matter of common knowledge that, while Great Britain led the way in all other branches of engineering science—the origination and introduction of the steam-engine, the steam-ship, the railway, gas lighting, &c.—and in the earliest great discoveries and application of electrical power, she now lags far behind other countries, and especially the United States, in the development of electrical science in modern times. The names of Davy, Faraday, Grove, Varley, Wheatstone, Swan, and Hughes, recall the earlier achievements of British inventors and discoverers in the field of electrical science; Hopkinson and Armstrong, their successes in the practical application of the power. Why do we no longer occupy the foremost rank? The fact is due, says Mr. Swinton, "to the misguided action of succeeding Governments—Conservatives and Liberals being equally to blame—who, in their perhaps commendable endeavours to preserve the community from individualistic monopolies similar to those held by some of the gas and water companies, and in their less laudable desire to secure the political support of some of the less perspicacious classes of the nation, have succeeded in delaying to a very large extent in all cases, and absolutely arresting in some instances, electrical development in some of its most important directions." For this stoppage or delay, blame is cast chiefly upon the Electric Lighting Act of 1882 (with its provision for purchase at the end of twenty-one years); the opposition of local authorities to the applications of private traders to Parliament for leave to commence an electric supply, followed by their leisurely obtaining, and still more leisurely exercising, Provisional Orders themselves; and the purchase clauses in the General Tramways Act of 1870. So, while we have been advancing but slowly, America and Germany have been making enormous strides, and obtaining great engineering experience. They are, therefore, enabled to supply us with not only our electrical plant, but consulting engineers. The whole of the electrical plant for the Central London Railway, the generating machinery for Manchester, engines for Glasgow (enough "to make James Watt turn in his grave"), all these and more are we importing from the States. As to exports, "when English manufacturers are unable to compete at home, how can they expect to do so abroad?" Our readers will have been amused to notice how Mr. Swinton, in the first quotation made from his article, is led—by his jealousy of the rival illuminant of electricity, gas—into a self-contradiction. Governments are reproved for desiring to secure the political support of certain classes by doing—what? Something particularly blameworthy? Oh, no. By endeavouring to do something which is "perhaps commendable"—namely, "to preserve the community from individualistic monopolies similar to those held by some gas and water companies!" What is there heinous in the offence of seeking political support by doing that which is commendable? The electrican thanking God he is not like these gas companies, who have individualistic monopolies without any purchase clauses attached, is distinctly entertaining.

Such, in brief, is Mr. Swinton's indictment of the existing conditions under which electrical enterprise struggles to advance; and Lord Salisbury, as a practical electrician, "who must be aware of the great importance of the question," is appealed to for his personal support of the present applications to Parliament. "At bottom all improvement is due to individual effort, and where, as has hitherto been the case in the electrical world, the municipality is allowed always to step in and reap the rewards rightly due to private enterprise, progress must inevitably suffer, if it does not entirely cease."

Incidentally, a fact is mentioned which must always handicap this country in the race of electrical development—namely, the absence of the great natural sources of hydraulic power possessed and used by America, Switzerland, and Norway. But, says the writer, "we have what, when all is said and done, is the practical equivalent—vast stores of potential energy in the shape of coal." But we would ask, Is not the difference in cost between coal-energy and water-energy sufficient to account for some at least of the backwardness of this country, as compared with the countries having vast sources of natural power, in adopting electricity as an agent?

THE USES OF STEAM IN MODERN CIVILIZATION.

The number of "The Boiler Maker" for the current month contains an article on the above subject by Mr. E. A. Harman, M.Inst.C.E., Engineer and Manager of the Huddersfield Corporation Gas-Works. At the outset, the author frankly states that he considers that the power and properties of steam are but very imperfectly understood, and that its application is only in its infancy. The mania nowadays is for electricity; and it seems to be rather taken for granted that steam is getting out of date, and is being superseded by a more powerful and mysterious force. Mr. Harman, however, is of opinion that the superiority of steam for motor purposes over all kinds of liquid or gaseous fuel or air remains impregnable. The chief weakness, according to his experience, has been with reference to the design and construction of boilers. On the subject of the use of steam in gas manufacture, the author points out that it is largely employed in connection with regenerator furnaces; a continuous supply of steam from a boiler being passed under the furnace-bars in many works. Further, in the event of mains getting blocked with naphthalene, a jet of steam is known to be the best solvent obtainable, and is invariably used for such purposes. During the winter months, when the gasholder cups and purifier lutes are in danger of becoming frozen and stopped up with ice, a supply of steam is allowed to issue into the water of these self-sealing lutes, which keeps the temperature considerably above the freezing-point. In some few cases, a small jet of steam has been applied to the ascension-pipes, with the view of preventing them from being choked up with thick tar, pitch, or other residue. In the case of certain of the purifying apparatus, such as the scrubbers and washers, these are sometimes beneficially steamed with the object of washing down the thick tar which may have accumulated therein. Mr. Harman relates that he had for some years a tower scrubber 15 feet in diameter and 70 feet high full of coke. It was invariably the plan to have this scrubber well steamed; the steaming process commencing at the top, and being gradually continued to the bottom. By this method the thick tar was dissolved from the top chambers and washed down to the bottom, leaving the coke fairly clean.

The author is convinced that the uses of steam have not yet been sufficiently appreciated for domestic purposes. Food can, he says, be cooked by steam very much better than by boiling it in water; and it is somewhat surprising that it has not been more largely used for these purposes. The utilization of steam for medical purposes seems to have made little progress, except

with regard to the kettles in use for bronchitis, asthma, pneumonia, and kindred lung affections. One cannot help considering that something more might be effected most advantageously by a definite study of the use of steam intermixed with various gases for the treatment of consumption and other distressing complaints. Steam, which has played its part so successfully during the last century, will, in the author's opinion reassert its right on better examination and study. It is not merely the question of steam which requires elucidation, but the all-important one of fuels, which opens up a comprehensive subject. Nor is this question the only one that needs examination. The nature and quality of the waters used form a most important part in the consideration. The disastrous effects of hard water in scaling boilers, is well known; but the more disastrous effects of solvents and water softeners in the form of noxious chemical solutions has not received the same amount of attention. On the other hand, very soft water has been often indeed used with alarming results.

After a few remarks on forced-draught apparatus and fuel economizers, Mr. Harman concludes by saying that what is needed is for some student to get right away from the present-day environments, back to the primitive steam-kettle, and study it in George Stephenson's fashion, with the view of eliciting something further of its secrets and mysteries. Such a study cannot, he says, be undertaken in the crowd or in the workshop; it must be pursued with all eagerness and avidity in the quiet of a country home, in the study, and in the laboratory.

PERSONAL.

Mr. R. DARNEY, who has occupied the position of Engineer and Manager of the Faversham Gas-Works for forty years, has retired; and has been appointed Consulting Engineer to the Company. Mr. ALFRED EASTON, of the Commercial Gas-Works, has been chosen to succeed Mr. Darney.

Mr. JOHN HILTON, who for fourteen years has been in the service of the Westhoughton Gas Company, for the past five of which he has filled the position of Assistant Secretary, has been appointed Secretary and Manager, in succession to Mr. J. Pickup, whose resignation, owing to advanced age, was announced in the "JOURNAL" for the 13th inst.

We much regret to learn that the health of Mr. WILLIAM CARR, the Engineer and Manager of the Stalybridge Gas-Works, has been again so unsatisfactory that he has had to leave England. He sailed for the Canary Islands on the 17th inst. It may be remembered that Mr. Carr was seriously ill rather more than two years ago, and was unable to attend to his duties. His health was much improved by the rest and change; and we are sure that all his colleagues will join us in wishing that he may return from his present journey with a large measure of his former vigour and energy restored to him.

As the result of the offer of a substantial inducement to Mr. MATT. DUNN to remain at Goole, he has declined to take the appointment at Buxton which, as announced last week, he had been chosen to fill, in succession to Mr. Smedley. Mr. HAROLD BARKER, of Pontypridd, who was next on the list of selected candidates, will now have the position. It was for purely family reasons that Mr. Dunn sought a change of residence; his family having never been free from sickness since they went to Goole. When the District Council received his resignation, they at once unanimously resolved to offer him an advance of £100 per annum in his salary for a term of three years, and consented to his family residing out of the town if found absolutely necessary. The Council felt that the loss of Mr. Dunn's services at a time when the construction of new water-works and improvements in the gas-works were being proceeded with would be a serious thing, inasmuch as he has in his hands all the details in connection with these matters. He has always been cordially supported by the Council.

OBITUARY.

Mr. E. J. PHILLIPS, J.P., who had been a Director of the Newport (Mon.) Gas Company for no less than 48 years, and was Chairman of the Board for 18 years, died last Saturday week. He was one of the best known and respected men in Monmouthshire; and he and his brother, Mr. Griffith Phillips, were among the early pioneers of the gas enterprises in Cardiff and Newport. The deceased gentleman was born at Carmarthen rather more than 80 years ago.

Mr. ALEX. OSBORNE, the "Father" of the Town Council of Glasgow, died at his residence at Kelvinside, on Friday last. Mr. Osborne entered the Town Council so far back as 1862. He was for a long time one of the Magistrates of the City, and was twice offered the Lord Provostship, but declined the honour. For many years he was Convener of the Water Committee of the Corporation. It was under his auspices that the scheme for doubling the water supply from Loch Katrine was promoted; and he lived to see it all but completed. It is not too much to say that in Glasgow, on account of his public services, and particularly his labours in connection with the water supply, Mr. Osborne was revered. This feeling was given expression to about four years ago, by the public presentation to him of his portrait.

NOTES.

The Perishing of Paint.

An article on the durability of paint has been published in the "Builder" by Mr. H. C. Standage. The writer discusses the nature of paints, and the influences to which they are exposed. It is mentioned that much of the wearing away of paint on outside surfaces in some localities where there is much grit and dust in the air, is a purely mechanical action. The only remedy for this mischief is to make the paint as tough and elastic as possible, instead of hard and brittle, which can only be done by restricting the use of driers in the paint, and mixing it, if possible, with linseed-oil varnish only. Mr. Standage also deals with the blistering of paint and the permeation of the coating by water. The latter is the most destructive of all agencies; and this may be shown by simply putting test pieces of painted iron in water for a few days. The permeability of linseed oil to water is due to the presence of glycerine. The non-adherence of a paint to the surface to which it is applied is sometimes referable to the same cause. The destruction of paint coatings by acid or alkaline gases is largely a question of the sponginess of the coating. Unfortunately, no indication is given of a way to prevent the formation of glycerine as linseed oil dries.

The Premium Plan of Labour Remuneration in England.

It is reported by "Engineering" that the premium plan of paying workmen, recently discussed in the "JOURNAL" as an American invention, has been adopted with the happiest results by the firm of Reavell and Co., Limited, of the Ranelagh Works, Ipswich. The breakfast break has been entirely done away with. The shop hours are from 7 in the morning until noon, and from 1 to 5·30 p.m. on ordinary days, the works closing at 12 o'clock on Saturdays. There are thus 52½ working hours in the week, which is nevertheless paid for as 54 hours; the extra hour-and-a-half being added as a bonus when there has been no time lost for the week. The wisdom of this arrangement is particularly evident at this time of high pressure, when missed time cannot be visited with a high hand, and the lost morning quarter has to be winked at in many a shop as the least of many evils—greatly, of course, to the injury of discipline. The premium plan as adopted by Messrs. Reavell, whose speciality is high-speed steam-engines, is exactly the same as that described in the "JOURNAL;" the workman receiving as a premium one-half of the value of the time he saves over every job as compared with the standard allowance. Thus, the higher the wages taken by the workman, the lower the wages cost of the piece, which is consequently otherwise than with common piecework, where the labour cost per piece remains the same no matter how much money the man earns. The well-known objections to piecework do not apply to the premium system, under which the workman has every inducement to continuously increase his output.

Throwing a High Chimney.

The operation of throwing a lofty brick or masonry chimney is often a delicate one for carrying out in a crowded town. A successful performance of the kind is mentioned in the "Engineering Record" as having been accomplished in Brooklyn. This was the demolition of a shaft in brickwork 168 feet high, containing about half-a-million bricks laid in cement. The flue was 2½ feet square, and the walls 3½ feet thick at the bottom. Two men with chisels first cut away the whole of the front wall from the base to a height of 4 feet, shoring up as they went with 12 in. by 3 in. uprights, 6 in. apart, well wedged up between the top and bottom wooden sills. Then the remaining corners of the chimney were cut away, so as to leave only a narrow pier in each side. Kindling wood and coal were piled round the shores, and set on fire. In twelve minutes the shores were sufficiently burnt through to let the chimney fall slowly forward in the intended place. The whole job only took two men a day and a half. It was at first intended to throw the chimney over by means of screw-jacks, without the use of fire. By this method, one of the front walls at the bottom would be entirely cut away in the direction in which the shaft should fall, and the cutting would be continued round each corner nearly half way, so as to barely remain stable. Then two holes for jacks would have been cut in the middle of the back wall, the jacks inserted, and screwed up as quickly as possible, thus throwing the chimney over. Evidently, the weight to be dealt with limits the employment of this method to comparatively short shafts. Where there is plenty of room, dynamite or gun cotton will do the work with the smallest amount of labour; but they are uncertain.

The Oxidation of Ammonia by Iron.

A suggestive paper on the oxidation of ammonia by iron ore has been read before the Scottish Section of the Society of Chemical Industry by Dr. W. Carrick Anderson and Mr. G. Lean. The authors start from the discovery of Lowthian Bell that the reduction of peroxide of iron by carbon monoxide gas begins at comparatively low temperatures. In the case of precipitated oxide, it is found that a slight action shows itself at temperatures as low as 141° to 149° C. The oxidation of hydrogen gas would also appear, according to the same authority, to start at or about the same limits of temperature. From consideration of these results it might very fairly be concluded that other hydrogen containing gases would undergo a like decomposition by iron ores at similar

temperatures. Dr. Anderson and Mr. Roberts have already shown that on distilling mixtures of raw coal and iron ores in a retort, a considerable proportion of the ammonia liberated in the composition of the coal was destroyed through the action of the oxides; and this destruction was indicated as a possible source of loss in the recovery of ammonia as a by-product in blast-furnace working. Further experiments have therefore been carried out with the object of determining the relative amount of this decomposition at different temperatures. The results go to show that the action of ammonia on ferric oxide begins at temperatures between 140° and 150° C., a result which agrees with the statement of Lowthian Bell that carbon monoxide begins to effect a reduction of the peroxide at or about the same temperature. The action rose with the temperature, until at 200° C. a previously-heated iron ore destroyed 54·2 per cent. of the ammonia passed through it. Asked whether any examination of the iron ore after the passage of the ammonia had taken place, with the object of ascertaining the exact nature of the change, the answer was in the negative. It was concluded from the formation of water that the change was solely one of oxidation of the alkali, the peroxide of iron being reduced to protoxide.

Midland Association of Gas Managers.—The annual meeting of the Association will be held at the Grand Hotel, Birmingham, next Thursday. We learn from the circular issued by the Hon. Secretary (Mr. Charles Meiklejohn, of Rugby) that, in addition to the reception of the report and accounts for the past year, and the delivery of the Inaugural Address by Mr. J. Ferguson Bell, of Stafford, the papers read at the autumn meeting by Mr. G. Helps and Mr. B. W. Smith, on "Retort Heating" and "Inclined Retorts," will be discussed.

Competitive Plans for New Gas-Works.—Early last year, prizes were offered for the best plans for a new gas-works for Rixdorf, near Berlin; and it is now announced that nine competitors entered the lists. The first prize of £350 has been awarded to Herr L. Gumz, Engineer of the Bremen Gas-Works; the second prize of £250 to Herr E. Körting, Engineer to the Imperial Continental Gas Association at Vienna, and Herr C. Bernhardt, of Charlottenburg, for a joint design; and the third prize of £150 to the Berlin-Anhalt Engineering Company and the Stettin Fire-Clay Works, also for a joint design. The successful plans have been exhibited in the Rixdorf Town Hall.

The Gas Supply of Paris.—The revenue from the sale of gas in Paris last year amounted to 82,630,736 frs. (£3,305,229), as compared with 80,971,744 frs. (£3,238,869) in 1898; being an increase of 1,658,992 frs. (£66,360), or 2·05 per cent. We learn that negotiations have been set on foot for a reduction in the price of gas to 20 c. per cubic metre, subject to the payment of the extra 10 c. (the Company's price under their Treaty being 30 c.) by the Municipality until the expiration of the concession on Dec. 31, 1905; a loan of 182,000,000 frs. being raised for the purpose. The idea seems to be that when they take over the concern they will continue the price at 20 c., devoting the profits to the redemption of this debt. Possibly something more may be learnt in regard to this scheme from the next report of the Directors, which will soon be due.

Another Pamphlet on Sulphate of Ammonia.—The Sulphate of Ammonia Committee are determined that there shall be no lack of reliable information on the subject of the manurial value of sulphate of ammonia; for they have followed the issue of the exhaustive essay by Mr. James Muir, which gained their prize, by the publication of another by Mr. R. Warington, M.A., F.R.S., formerly Sibthorpian Professor of Rural Economy in the University of Oxford. Its title is "Sulphate of Ammonia: Its Characteristics and Practical Value as a Manure." The author has divided his essay into two parts; dealing in the first with the history and characters of sulphate, and in the second with the agricultural results obtained by its application to crops—taking in succession wheat, barley, oats, grassland, potatoes, sugar beet, mangel wurzel, and turnips. The second is by far the larger part—occupying 100 out of the 130 pages of the pamphlet, which is clearly printed, in paper wrapper, and forms an important addition to the literature of the subject.

The Supply of Electric Power in the United States.—We learn from "Nature" that a proposal which has been put forward to generate electricity on the Canadian side of the Niagara and to sell electric power on the American side, has caused a flutter of excitement among American electricians. The New York "Electrical Review" states that the question has been raised whether foreign-made electricity is not subject to a duty of 10 per cent. *ad valorem* as an "unenumerated manufactured article." This question has produced a flood of debate, and while it is purely hypothetical as yet, the Merchants' Exchange of Buffalo and the Niagara Falls Power Company have gone so far as to pass resolutions opposing such taxation. Those who desire discrimination in favour of home-made electricity argue that electric power is a vendable and valuable product of manufacture; that it can be measured easily and accurately; and that foreign-made electricity should pay duty equally with foreign-made cloth or wine. Those who believe in free trade in electricity point out that it is not an article; that it is not valuable or sold or saleable; that it has no power to do work, but only serves as a means of transmitting power; and that it is impossible to import it, as it instantly returns to its source.

TECHNICAL RECORD.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

The Thirtieth Annual Meeting of the Institution was held last Saturday, at the Grand Hotel, Manchester. Mr. R. G. SHADBOLT (Grantham), the retiring President, occupied the chair at the opening of the proceedings.

The minutes of previous meetings having been approved of,

The HON. SECRETARY (Mr. S. S. Mellor, of Northwich), read a number of letters received from members unable to be present.

NEW MEMBER.

Mr. Edwin Harry Hudson, Manager and Secretary of the Normanton Gas Company, was elected a member of the Institution.

THE REPORT AND ACCOUNTS.

The HON. SECRETARY read the annual report of the Committee as follows:—

The Committee, in presenting the thirtieth annual report, beg to congratulate the members on the continued prosperity of the Institution.

There have been elected during the year 11 members; 2 have retired under Rule 17; 2 resigned; and 2 have died—viz., Mr. J. C. Ingham and Mr. G. E. Stevenson—leaving 137 members on the roll of the Institution. Both members removed by the hand of death were useful members in their respective spheres—Mr. Ingham by his close and unremitting attendance, and Mr. Stevenson by the many ways in which he contributed to, and assisted in, our proceedings. Apart from the tragic manner of Mr. Stevenson's death, it must appeal strongly to the feelings of the Institution, inasmuch as he was at the time our Senior Vice-President and an undoubted leader among us. It is not often death strikes so high in our ranks; and we sincerely trust it may be long ere we thus suffer again. With these exceptions, the year's transactions have been of a most successful and instructive character.

The twenty-ninth annual meeting was held in Manchester, when a visit was paid to the Gaythorn station of the Manchester Corporation Gas-Works, where an installation of coke conveying machinery applied to inclined retorts was inspected; the visit being of a satisfactory character. On the meeting being constituted at the Grand Hotel after lunch—Mr. Haddock in the chair—there was a good muster of members. The minutes of the previous meeting were read, confirmed, and signed; and new members and office-bearers for the ensuing year were elected. Mr. R. G. Shadbolt was then conducted to the chair, and delivered his Inaugural Address, for which a hearty vote of thanks was accorded him. The adjourned discussion on Mr. Brearley's paper entitled the "The Balance Sheet," was then taken, and proved both interesting and animated.

The May meeting was held at Kendal; and there was a large attendance of members, who were entertained to luncheon by the Mayor and Corporation of Kendal. The courtesy thus shown to the members was suitably acknowledged. The members then paid a visit to the gas-works, where the plant and machinery were inspected. Mr. Ritson had prepared a full description of the works, which description had been distributed to the members earlier in the day. A visit was then paid to the Fisher Tarn reservoir of the Kendal Corporation Water-Works. On re-assembling at the Town Hall, further acknowledgment was made of the obligation under which the Institution had been placed by the Corporation and Mr. Ritson for the admirable character of the day's programme.

The one hundred and nineteenth quarterly meeting was held at Blackpool. The proceedings opened with a visit to the Corporation Gas-Works. Mr. Chew and his son (Mr. Wm. Chew) conducted the members over the establishment, and pointed out the various items of interest. A hearty vote of thanks was accorded to the Corporation for their permission to visit the works. Mr. Whatmough read a paper entitled "Notes on the Working of a Self-Loading Governor," which elicited a good discussion. A paper, entitled "Gas-Traction on the Blackpool, Lytham, and St. Annes Trams," prepared by Mr. Wm. Chew, was taken as read. The members next paid a visit to the tramway gas-compressing station, where the plant was carefully inspected; a hearty vote of thanks being accorded to the Tramway Company for permission to visit the station.

The November meeting was held at Bradford on Saturday, Nov. 25, under the presidency of Mr. Shadbolt. There was a fair attendance of members. Mr. T. N. Ritson, of Kendal, was unanimously elected President for the ensuing year. Mr. Thomas Newbigging, C.E., contributed a paper, entitled, "Some Disputed Points in Gas and Water Legislation," which evoked a good discussion. Mr. Graham introduced for discussion the subject of "Laying Gas and Water Mains in Public and Private Streets," and Mr. G. W. Lupton that of "Profit Sharing, or Payment by Results," which was well taken up by the members. Messrs. Graham and Lupton are to be commended for bringing forward subjects for discussion in such concise form; and we would specially call the attention of the members to the fact that we cannot, and do not, expect every communication to partake of the form of a complete essay—that we, of necessity, leave to the National Institute. We are fully persuaded that there are many of our members who could in various ways introduce subjects not only of interest but of utility also; and where there is an antipathy to the preparation of anything approaching an exhaustive essay and the subject-matter held back in consequence, we submit there is a distinct loss to the Institution as well as the individual member. We are persuaded there is vitality in our ranks and to spare. Still, successful as our gatherings have been, we would suggest that a few more volunteers and a few less pressed men would prove mutually beneficial.

R. G. SHADBOLT, *President.*
SAML. S. MELLOR, *Secretary.*

The report was accompanied by the statement of accounts.

Mr. W. NEWBIGGING (Manchester), in moving the adoption of the report and accounts, observed that there was one item in the latter to which he would like to call attention. He referred to the balance standing to the credit of the Institution, which had increased from £18 14s. a year ago to £41 8s. now. He wished to ask the Committee whether they had any object in allowing the balance to increase to this extent. The Institution had no dividends to make up, or contributions in relief of the rates, or liabilities of any kind that would involve dipping into a fund of this character. It was very easy to get rid of money; but, of course, to get rid of it judiciously was another thing. There were one or two funds to which members might deem it

advisable to contribute. There was the Gas Institute, which was hampered for lack of funds, but which did excellent work, in a quiet and unostentatious manner. Then there was the question of making some payment to the Honorary Secretary for his valuable services, of which the funds at their disposal would allow. There were also other ways in which the balance might be judiciously expended; but he should like to hear the views of members on the matter.

Mr. W. W. HUTCHINSON (Barnsley) seconded the motion. He remarked that the report bore evidence that the proceedings had been of an eminently satisfactory character; and the statement of accounts, according to the previous speaker, showed that they were suffering from an over-sufficiency of funds. As to the matter of getting rid of the surplus, he thought this could be dealt with separately; and he himself might be disposed to make a proposition.

The motion was unanimously adopted.

Mr. HUTCHINSON said that, without knowing the wishes of the "inner circle" of the Institution, and speaking on the spur of the moment, he begged to propose that the sum of ten guineas be given to the Honorary Secretary and twenty guineas to the Reserve forces; leaving for more deliberate consideration by the General Committee the question of the payment of an annual sum to the Secretary.

Mr. J. WILKINSON (Drighlington) asked whether they had power, by the rules, to vote sums of money for objects outside the organization.

The PRESIDENT said he should hold at the present juncture, they had not the power. They had certainly the right to dispose of their money as they wished for the objects of the Institution; but, if he had the ruling, he should say they were not justified in voting money for outside purposes. They had not, however, had a seconder to the motion.

Mr. WILKINSON said, in order to test the question, he would second the motion.

Mr. ISAAC CARR (Widnes) said this was a simple matter, but it required to be dealt with in a proper way. He thought it should be left to the Committee who managed the affairs of the Institution. This was not the first time they had had a large balance; and the Committee on such occasions had frequently suggested ways of disposing of it. In whatever way it might go, he thought it was the duty of the Committee to submit for the approval of the members any scheme they might decide upon. He was, in any event, directly opposed to the meeting attempting to come to any decision on the point. He moved, as an amendment, that the matter be referred to the Committee for consideration.

Mr. H. KENDRICK (Stretford) seconded the amendment, and suggested that one way in which they might get rid of some of the surplus would be to do as some other Institutions did—namely, give premiums for papers read at their meetings.

Mr. HUTCHINSON said he was quite willing to withdraw his motion. He agreed that the Committee should have a voice in the selection of the objects to which the surplus should be applied, and it would have been better if it had occurred to them to make some recommendation.

The PRESIDENT said the Committee did not know what the balance would be until they received the balance-sheet at the same time as the ordinary members; and consequently they had not had time to consider the matter. So far as remunerating the Honorary Secretary was concerned, he might say that individually—he was not speaking officially—members of the Committee thought Mr. Mellor was deserving of some remuneration.

Mr. E. E. J. ANDERSON (Ripon) suggested that the President and Secretary should be presented with medals as mementoes of their year of office.

Mr. Hutchinson, as the mover of the substantive motion, and Mr. Wilkinson as the seconder, withdrew their proposal.

The PRESIDENT said, as the motion had been withdrawn, the whole thing fell to the ground, and the Committee were left to deal with the matter. They would take it as an expression of opinion that they should consider the question of the disposal of the balance; and they would, of course, have before them the various suggestions.

ELECTION OF OFFICERS.

Mr. KENDRICK moved that Mr. Charles Wood be elected Senior Vice-President for the year. Mr. Wood, he added, had given them a reason why he could not be President during the present year; but he (Mr. Kendrick) thought he would be a worthy successor to the presidential chair if, when in accordance with custom it became the turn of the Senior Vice-President to go forward to the chair, he could see his way to do so.

Mr. J. H. BREARLEY (Longwood), in seconding the motion, said Mr. Wood commanded the respect of the Yorkshire members, and, he thought, of the members generally. Some of the members, however, had perhaps no very great respect just now for Mr. Wood's Corporation; but they must not let that stand in his way.

The motion was carried with acclamation.

Mr. WOOD, in accepting the office, said he hoped that next year he might be in a better position to succeed—if they thought it desirable—to the presidential chair. He would do his best for the interests of the Institution; and he only hoped that those members who at present had any hard feelings towards the Bradford Corporation might—at any rate, some of them—before very long be part of the Bradford Corporation.

Mr. H. TOWNSEND (Wakefield) proposed the appointment of Mr. Arthur Graham, of Mansfield, to be Junior Vice-President. Mr. Graham would, he was sure, well uphold the dignity and usefulness of the Institution.

Mr. WILKINSON, in seconding, observed that Mr. Graham was well known to almost all the members, and he hoped he would continue to enjoy good health, and gain still further well-earned promotion.

Mr. GRAHAM briefly thanked the members for electing him to the post, and promised to do his utmost for the welfare of the Institution, although he was somewhat awkwardly fixed in the matter of distance.

The re-election of Mr. Thomas Newbigging as Treasurer was moved by Mr. J. BRADDOCK (Radcliffe), who remarked that whether they regarded that gentleman as the custodian of their funds, or as perhaps the most frequent contributor to the technical proceedings of the Institution, they must consider him a most valuable member.

Mr. H. FOWLER (Horwich) seconded the motion; and it was unanimously adopted.

The PRESIDENT proposed the re-election of Mr. Mellor as Secretary—remarking that he and other Presidents could testify that Mr. Mellor was the right man in the right place.

Mr. R. SURTEES (Lymm) seconded the motion, and it was enthusiastically adopted.

Mr. MELLOR, in thanking the members for his re-election, expressed the hope that the Institution would continue to grow in numbers, and that they would have some good papers at forthcoming meetings.

On the motion of Mr. MELLOR, seconded by Mr. F. BARRETT (Ramsbottom), Mr. J. Wilkinson, of Drighlington, was elected a member of the Committee in place of Mr. Ritson, the new President.

Mr. G. S. FRITH proposed, and Mr. S. MOYS seconded, a motion that Mr. S. Meunier, of Stockport, be elected a member of the Committee; and Mr. LUPTON proposed, and Mr. DAVIES seconded, the election of Mr. Tim Duxbury, of Middleton, to the Committee. These proposals were unanimously adopted.

On the motion of Mr. H. HAWKINS, seconded by Mr. BUCKLAND, Messrs. Lamb and Severs were appointed Auditors.

THE NEW PRESIDENT.

The PRESIDENT, in introducing the new President, Mr. T. N. Ritson, of Kendal, said this was a pleasant duty to perform, but one not altogether untinged with regret. He (Mr. Shadbolt) was convinced, however, that he was handing over the reins of office to a gentleman who would do credit to himself and to the Institution generally. Mr. Ritson was not unknown to the members by any means; and he had contributed to the proceedings in more ways than one. They had for some years looked upon him as one of the rising men of the gas profession; and he had the ability, willingness, and spirit to carry out the duties of the presidency in the very best manner.

Mr. RITSON then took the chair, and at once proceeded to read his

INAUGURAL ADDRESS.

Gentlemen,—It is with mingled feelings of pleasure and regret that I find myself to-day in the position of President of this important Institution. The fact that you have thought fit to confer this honour upon me is of itself a real pleasure; and I appreciate it all the more, because it is a tangible expression of that kindly feeling of good fellowship which I have always experienced at the hands of the Council and members of the Institution. On the other hand, it is with feelings of the deepest sorrow that the lamentable calamity which befell our esteemed friend and colleague, the late Mr. George Ernest Stevenson, should have deprived our Institution, not only of its President-elect, but also of one of the kindliest and most estimable men in the whole gas profession. To know Mr. Stevenson was a real pleasure. His amiability, kind and unassuming manner, combined with his many high qualities and abilities as an engineer and gas expert, placed him in the front rank of his profession. The loss to the Institution is incalculable; for his able contributions to the proceedings, his versatile and ready speech, were the admiration of all. To his sorrowing wife and family, we extend our sincerest expression of heartfelt sympathy in their sad bereavement. I regret also—and I am sure I voice the sentiments of our members—that Mr. Charles Wood found it impossible, owing to excessive pressure of business, to go forward to the chair. I am glad, however, that we are to have the benefit of his able generalship next year.

Called upon, as I have been at short notice, to fill the breach thus caused, I must crave your indulgence if I fail to rise in a manner befitting the occasion. When I look back and review the names of the many eminent gentlemen who have preceded me in the presidential chair, I feel my inability to discharge worthily the duties devolving upon me in a way I least expected when I fell a victim to your unanimous call to office. I will, however, do my best; and backed up, as I am sure I shall be, by a Council of good men and true, I am hopeful that the duties devolving upon me during my year of office may be carried out to your satisfaction.

Looking back at the century which is now nearing an end,

one is at once struck with the gigantic strides that have been made in every direction. It has been a century of constant progress, advancement, and civilization. When we consider what steam, railways, chemical and engineering sciences, gas, electricity, telegraphy, telephony, &c., have done for mankind generally, it is truly marvellous. Take, for example, the enormous development of our railway system. In the year 1825, the first railway line (Stockton and Darlington) was opened for passenger traffic. It is computed that there are now no less than 21,500 miles of railways in the United Kingdom, representing an invested capital amounting to the vast sum of £1,089,765,095.

It is beyond our power to foretell what science has in store for us in the future; but it is certain that, with the continued advance in education, and the opportunities which have been, and are still being, made for the study of practical engineering, chemical, and other sciences, great things may be anticipated. From past experience, we know that the knowledge of to-day vanishes before that of to-morrow—science never stands still. A few new facts soon upset pet theories. It is recorded of that great and renowned philosopher Sir Isaac Newton that, when dying, he said: "I seem only like a boy playing on the shore, and diverting myself in now and then finding a smoother pebble, or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me." How truly applicable are the words of that memorable man, even in our day.

Our own industry, "The Art of Gas Manufacture," is just about a century old; and to William Murdoch must be given the premier place as the pioneer of gas lighting. What do we find to-day? There are 661 authorized gas undertakings in the United Kingdom.

Local authorities own	222
Private companies own	439
Total	661
Total coal carbonized per annum	12,841,817 tons.
Gas produced " "	138,146,994,782 cubic feet.
Gas sold " "	127,365,376,845 cubic feet.
Capital employed	£82,109,752

In addition to the above, there are over 1000 non-statutory gas undertakings in existence, who furnish no returns, but whose make of gas amounts to many million cubic feet per annum.

Figures like these tell their own tale, and show, not only the enormous development in gas engineering enterprise, but also that the undertakings which we have under our control are of widespread national importance. Whether in respect to lighting, heating, or motive power, coal gas must be ranked as among the greatest enterprises of the century. There are now few cities, towns, or villages which do not possess a gas-works; and it is satisfactory to note that, notwithstanding competition from oil, electricity, and the newly-discovered acetylene, the demand for gas is steadily on the increase, and gas stock stands to-day probably higher than at any other period in the history of gas manufacture—proof, if such be needed, of its popularity as a domestic and manufacturing agent, and of the public confidence reposed in it as a medium for sound financial investment.

The following comparative table, compiled from the Board of Trade Returns, shows the progress of the gas industry since 1882, when the first Electric Lighting Act was passed:—

——	Year.	Number of Authorized Undertakings.	Amount Authorized.	Paid Up and Borrowed.	Tons of Coal Carbonized.	Gas Made.	Gas Sold.	Mileage of Mains.	Number of Consumers.	Number of Public Lamps.
			£	£	Tons.	Cubic Feet.	Cubic Feet.			
Companies' returns	1882	352	46,906,701	32,934,935	4,928,695	49,360,289,059	45,484,910,194	11,500*	1,055,009	224,300
Local Authorities' returns	1882	148	20,911,154	17,326,183	2,352,062	23,223,054,342	21,129,033,704	5,400*	916,962	137,011
Total	..	500	67,817,855	50,261,118	7,280,757	72,583,343,401	66,613,943,898	16,900	1,971,971	361,311
Companies' returns	1899	439	63,709,947	53,494,781	7,958,669	86,705,722,752	80,077,717,158	15,451	1,670,847	319,007
Local Authorities' returns	1899	222	32,499,721	28,614,971	4,883,148	51,441,272,030	47,283,759,687	10,030	1,578,291	247,857
Total	..	661	96,209,668	82,109,752	12,841,817	138,146,994,782	127,365,376,845†	25,481	3,249,138	566,864
Increase	..	161	28,391,813	31,848,634	5,561,060	65,563,651,381	60,751,432,947	8,581	1,277,167	205,553

* Estimated. † Including 7,404,193,550 cubic feet of carburetted water gas and 82,550 cubic feet of acetylene gas.

I have never been one to regard the introduction of the electric light with disfavour, because I have always felt that there was room enough for both illuminants to work harmoniously together; and, moreover, that the demand for gas would continue to increase. Experience, backed up by the aforesaid statistics, proves this impression to have been well founded. That it is a keen competitor, cannot be denied. At the same time, it is one which has been of the greatest possible benefit to gas lighting, in stimulating inventive genius, and helping to create a demand for more light. There is no doubt our new rival has aroused gas authorities to a sense of public duty, and inspired them with a spirit of enterprise which would probably never have been dreamt of formerly; and the result has been increased output of gas and increased profits, while the public generally have benefited by cheaper gas and improved methods of lighting, both domestic and public.

The number of applications for Electric Lighting Orders and Bills grows apace. This year beats all its predecessors—there being no less than 131 schemes announced. Local authorities take the lead with 68; while private companies are represented by 63.

Notwithstanding the enormous development of electricity supply, it is interesting to note that, since the year 1882, no less than 77 gas undertakings have been purchased by local authorities from private companies; and there are several others down for the present session of Parliament. This growing desire on the part of local authorities to acquire gas undertakings not only shows that gas is more than ever regarded as a public necessity, but also the estimation in which they and the public generally regard investment therein.

I am reminded that this is the thirtieth annual meeting of the Institution; and it is a source of satisfaction to be able to congratulate you upon its continued prosperity and sound financial condition. It has occurred to me that it might be interesting, at this stage, to note the part the Institution has played since its formation in 1870, when that little band of gas engineers met together to talk over gas matters, and to bid our old and much esteemed friend Mr. Thomas Newbigging an affectionate "send-off" to Pernambuco. Gentlemen, we have Mr. Newbigging with us still; and I believe I echo the feelings of every member of the Institution, when I say how much we esteem, not only his friendly co-operation, but also value and appreciate the services he has rendered to the Institution and to the gas engineering world at large. We are glad he is among us still; and we trust he may long be spared to give us the benefit of his example, loyal devotion, and extensive experience as a gas engineer.

The Institution became at once popular, and step by step advanced into general importance, until now there are 138 members on the book, who have control of works carbonizing 2,127,000 tons of coal per annum. But what have the members generally done for the gas industry, through the medium of the Institution? I find that no less than ninety papers (a list of which I append hereto, and which I trust will be of use to the members), treating upon almost every important subject connected with our great industry, have been contributed to the "Transactions." This is noble testimony to the usefulness of the Institution, and shows that it is carrying out vigorously the objects of its promoters. Any society which can command such a succession of useful papers, and create lively discussions thereon, must necessarily be regarded as healthy and prosperous, and, moreover, of incalculable benefit to individual members and the gas industry generally. I trust in the future our members will be zealous in their endeavours to maintain the high reputation of the Manchester District Institution of Gas Engineers.

I rejoice to find that gas authorities are becoming more alive to the good work our various Institutions are doing for the gas industry, and are taking a more active interest in their welfare. I should, however, like to see them showing their appreciation in a more tangible form, by subscribing thereto for the purpose of research and other useful objects. There is a wide field in the gas industry for the scientist and lover of research; and who can tell what new discovery might be made which would convert what may now appear to be a negligible quantity into a profitable commodity?

It is the self-sacrificing efforts of individual members, who, at their own cost, have maintained and upheld the various Institutions, which have done so much for the benefit of the great industry with which we are identified. The business of a gas undertaking, outside the manufacturing department, has now grown to such magnitude, however, that the gas engineer and

manager has but limited time at his disposal for exacting and elaborate research work. In many large gas-works qualified chemists are employed; but in those of medium size, this is not always possible. Yet there are managers of such who have the ability to, and who would readily undertake research work, but are prevented from so doing because it would have to be done at their own cost, and at considerable sacrifice of time. Now, I maintain these are unreasonable demands to make of any gas manager. What I venture to suggest as a remedy, would be that gas authorities should be invited to contribute a certain small sum per ton of coal carbonized towards forming a fund for the purpose of employing one or more qualified analytical chemists, who would be at the service of members, acting under instructions of a technical committee, who would receive reports of all investigations made from time to time, and communicate the same to the Institution.

Such a scheme would, I feel sure, meet a want, and be of immense assistance to many gas managers desirous of undertaking technical investigations, but who are prevented from so doing because of the wherewithal and the necessary skilled assistance. Thus much valuable information which might see the light of day, may now be entirely lost. I believe many gas authorities would readily subscribe, if the benefits to be derived therefrom were clearly pointed out to them. This question was brought before the Southern Association by Mr. J. W. Helps in his Presidential Address, in 1897; but I regret it has not met with the attention which, in my opinion, it deserves. I trust it may be regarded of sufficient importance to receive the consideration of our Council.

The past year has witnessed an enormous increase in the price of coal, attributed to various causes—*i.e.*, increase in miners' wages, the "idling" miner, the war, and industrial prosperity. With regard to the former, this can only apply to a very limited extent, as it is absurd to pretend that the increases in wages granted are in any way proportionate to the increases in prices demanded. As to the second, now that wages are high there is no doubt a strong temptation for the miners to take matters leisurely, and so restrict the output; but I doubt very much if this plea can be borne out by actual facts. It is only to be expected that the war will have had some effect; but the abnormal rise is altogether irreconcilable under this head. The welcome revival of trade, particularly in the iron and steel industry, has naturally tended to inflate prices; but there is no doubt that prices have been forced up a great deal higher than even the industrial situation warrants. Under existing circumstances, it was quite expected that prices would be somewhat higher; but it is very questionable whether the present phenomenal rise can be justified by the actual position of either the coal trade or the industrial situation.

Colliery owners complain—and probably with reason—that the price of coal ruling of late has not returned a fair profit on the working. None would object to pay a remunerative price, so long as it was a reasonable and equitable one, if it was maintained uniform and steady. It is these extremes of depression and sudden abnormal increases that are so much to be deprecated. The policy of gas authorities of late has been to reduce the price of gas to the lowest possible limits, until there is now no margin left for such an unlooked-for and unprecedented rise in the price of raw material.

What the effect will be upon the price of gas now ruling, time will show. Already it has had an appreciable effect in some quarters; and unless prices come down to a reasonable figure before new contracts are entered into, an increase in price will be inevitable. If trade remains good—and there is every indication that it will—we must hope to be recouped somewhat by an increased output of gas, and augmented prices for coke and other residual products. I shall not be surprised, however, to see gas authorities going in wholesale for installations of carburetted water-gas plant. Then, when the "boom" has passed, coal-owners must not be surprised if they find the demand of many of their customers is diminished.

What with depleted stocks, the difficulties of getting supplies, and the troubles caused by the railway companies in dealing with the transit of material, many gas authorities have been seriously handicapped of late, and more than ordinary difficulty has been experienced in keeping up the supplies of gas. All this, in my opinion, points more conclusively than ever to the wisdom of making ample provision for the accommodation of larger stocks of coal, and so reduce these risks to a minimum. This is a subject which gas authorities will do well to take under serious consideration, if they wish to secure themselves against repetitions of the present crisis.

According to the official report of statistics relating to the mines of the United Kingdom, the output of coal for the year 1898 was 202,054,516 tons, of an estimated value at the pit mouth of £64,169,382, as compared with 202,129,931 tons, of an estimated value of £59,740,009, last year—showing a decrease in output of 75,415 tons, but an increase in money value of £4,429,373. The following diagram shows the development of the coal industry since 1870. It will be observed that, whereas the output has not quite doubled itself since 1870, exports are more than three times greater.

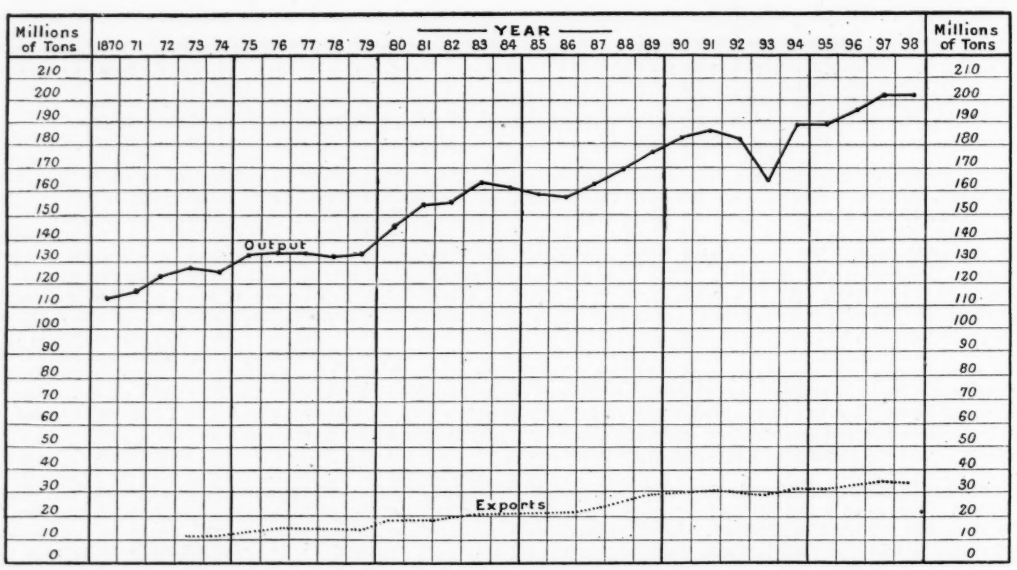


Diagram Showing the Output and Export of Coal Since 1870.

The question very properly presents itself, in the face of such figures, How long will our coal-fields stand this severe strain? Some centuries will yet elapse before the pinch is felt, nevertheless it is of the highest importance that every effort should be made to husband our coal and mineral resources, and adopt the very best plant and appliances possible in our arts and manufactures to obtain the best duty, and extract every unit of work and value out of the raw material, and not allow waste or undue consumption of this great source of our national wealth to be trifled with. That every effort is being made which science and mechanical ingenuity can devise to attain this end, in so far as the gas industry is concerned, cannot be gainsaid. The old-fashioned method of carbonization by direct-fired retorts is speedily giving way to the more elaborate and scientific systems of generator and regenerator retort settings, whereby the yield of gas per ton of coal carbonized and per mouthpiece has been largely increased, and that with a very considerable saving in fuel. In my own case, the whole of the direct-fired retorts have been replaced by generator and regenerator settings of the most modern design; and I can speak confidently of the savings effected, in every way, through their adoption. Again, the introduction of stoking machinery, coal breaking, elevating, and conveying machinery, inclined retorts, and carburetted water-gas plant are all factors in the right direction, enabling the highest duty to be obtained from the raw material.

Heat that was formerly wasted is now conserved and converted into useful energy, lessening the wear and tear of retorts, and increasing the yield of gas and the amount of the residual coke. The introduction of these scientific and mechanical appliances has effected another and none the less important function. The work of the stokers has been considerably lightened. There was a time—not so many years ago—when direct-fired retort-settings

were the rule, that clinkering and barring of the furnaces had to be done three or four times a day. Under the new *régime*, however, clinkering is only necessary once every three or four days. Moreover, while labour has been lightened, the hours have been shortened and pay increased. With such facts before us, it cannot conscientiously be said that consumers are getting cheap gas at the expense of labour. No; it is due to the advances which science has made in revolutionizing the methods of producing gas, the higher education and thoughtfulness of the men who have the control of our gas undertakings, and the spirited enterprise of the authorities in adopting the best and most efficient plant and appliances it is possible to secure.

Whether the method of continuous carbonization will ever become a "*fait accompli*" remains to be seen. Clegg tried it and failed; and others in our own day have unfortunately shared a similar fate. The fertile brain of man, however, has surmounted many obstacles; and he would be a bold person who would venture to assert that even this ideal is beyond the bounds of possibility. While the introduction of machinery and inclined retorts has done much to reduce waste, yet, when we consider the enormous quantity of gas which is still lost during the operations of drawing and charging retorts, there is still room for further improvement.

Condensation, although of such vital importance, is neither properly understood, nor has it received that serious attention it deserves. Granted that our knowledge of the behaviour of the various hydrocarbons and light-giving constituents, and the method of dealing with them, has greatly advanced during recent years, there is still much to be done before that stage of perfection, so much to be desired, is reached. This is a wide and complex subject, and worthy of extended inquiry, on the lines adopted by the Incorporated Gas Institute in 1882. I am of opinion that condensers should be placed under cover, and out of the direct action of climatic influences.

The question of mechanical washer-scrubbers *versus* tower scrubbers is one upon which a good deal of diversity of opinion exists. At my own works, I have adopted a combination of both. The use of too much washing water is to be deprecated; more damage is done by over-washing than is generally supposed. It is well known that water dissolves out small quantities of valuable illuminating hydrocarbons from the gas; and the loss of these, if the washing water is unduly great, may appreciably affect the illuminating power of the gas. The mechanical washer-scrubber in operation at Kendal has a gross volume of 254·4 cubic feet, and is capable of dealing with half-a-million cubic feet of gas per day. So far it has efficiently dealt with 360,700 cubic feet; equal to 1417·8 cubic feet of crude gas per day per cubic foot of gross volume, with an average production of 18 to 20 oz. liquor (by the distillation test), and with the employment of from ½ to 1 gallon of water per 1000 cubic feet of gas washed, according to the atmospheric temperature and time of the year. The small quantity—0·48 to 0·50 grain—of ammonia per 100 cubic feet found in the outlet gas, and taking into account the fact that analysis of the liquor shows it to be fully saturated with carbonic and hydro-sulphuric acids, satisfies me of the efficiency of this type of machine.

The question of purifying crude gas by means of the liquids obtained from condensation, washing, and scrubbing—viz., gas liquor—is a subject which requires further elucidation. Any investigation under this head would, I feel sure, well repay the labours expended upon it.

Washing and scrubbing, as ordinarily carried out, will remove about 30 per cent. of the impurities existing in crude coal gas—leaving the remainder to be taken up by the oxide of iron and lime purifiers. The question arises: Cannot the gas liquor be made to do better duty? I think it can, if properly applied. By a process which Mr. Holgate, of Halifax, has devised, and which has for its object the removal of these impurities, by means of purified ammoniacal liquor, he states that he is able to remove from 80 to 90 per cent., at the small cost of 0·024d. for each 1 per cent. of carbonic acid, equivalent to 0·048d. for each 2 per cent., which is equal to the enrichment of 1 candle.

No material alteration or improvements are to be chronicled in regard to purification. Oxide of iron and lime still hold the field. The introduction of small proportions of air, or of air moistened with steam or mixed with oxygen—the latter of which, by the way, appears to have run its day—have tended somewhat towards increasing the efficiency and reducing the cost.

The quantity of spent lime which in many towns is regarded as a waste product, is a subject of considerable interest. It is to the inventive genius of Mr. G. R. Hislop, of Paisley, that we are now in possession of apparatus which can successfully re-convert spent lime into a condition practically as good as new, and in one respect better, since the lime lies freer in the purifiers, and offers less resistance to the passage of the gas; and if the spent material is produced in the form of carbonate, it can be recovered continuously for a number of years. I have seen the process in operation at Paisley, where the make of gas is some 360 million cubic feet per annum; and Mr. Hislop informs me that while the foul gas contains on an average 3 per cent. of carbonic acid (or about double the average from English coal), the cost for purification is 0·28d. per 1000 cubic feet. With English coal, this figure would no doubt be further reduced. The following is an analysis of the original lime, and the same lime after six years' continuous restoration and use; the spent lime being in the form of carbonate, and containing about 1½ per cent. of hydrate of lime.

Analyses of Limes after Slaking and Drying at 212° Fahr.

	New Lime.		Same Lime after Six Years' Use.
Hydrate of lime	83·41	..	81·20
Carbonate of lime	3·82	..	3·15
Sulphate of lime	0·86	..	4·46
Magnesia	0·45	..	0·44
Iron and alumina	2·31	..	2·46
Silicia	2·26	..	2·32
Combined water	6·75	..	5·90
	99·86	..	99·93

These figures prove unmistakably that the lime has suffered very little indeed by its long use, and that the apparatus will do what is claimed for it—viz., re-convert spent or refuse material into an efficient and serviceable condition.

While gigantic strides have been made in plant and apparatus connected with the manufacture of gas, and the *modus operandi* of dealing with them, all tending towards lowering the cost of the manufactured article, yet probably one of the greatest advances is that relating to lighting. The older members of our profession will remember the time when a duty of 2½ to 2¾ candles per cubic foot of gas consumed was the best possible to obtain. The introduction of the argand burner was a further advance. Next came the regenerative burner, with a duty of some 6 or 8 candles per cubic foot; later the Welsbach "C" burner, developing a duty of some 14 to 15 candles per cubic foot; and more recently the new No. 4 Welsbach burner, with a duty of some 24 candles per cubic foot. Now we have introduced to us the Somzee-Greyson system of high-pressure intensified gas lighting, stated to develop 30 candles per cubic foot; and the hydro-incandescent gas-light, for which a duty of 40 candles per cubic foot is claimed. The Intensified Gas-Light Company give the following comparison of the illuminating power and cost of their system with electric incandescent and arc lamps, fishtail, argand, and regenerative gas burners, and the Welsbach "C" burner, with gas at 3s. per 1000 cubic feet.

Description of Light.	Illuminating Power. Standard Candles.	Consumption per hour in Cubic Feet.	Mantles.	Cost per 1000 Candles per hour in Pence.
		d.		
Electric incandescent light	15	0·25 per hour	—	15·2
Electric arc lamp, at 6d. per unit	—	—	—	3·0
Fishtail burner	15	5	—	12·5 to 22·5
Argand burner	25	8·8	—	
Regenerative burner	430	81·0	—	3·1
Welsbach "C" burner	50	3·5	0·8	3·3
Intensified	275	10·0	0·2	1·5

To make the foregoing comparison still clearer, they append the following table, showing the consumption for a year of a 16-candle power gas, giving a light of 4000 candles, by the intensified system, as compared with ordinary fishtail and Welsbach "C" burners:—

No. of Burners.	System.	Consumption in 1000's of Cubic Feet.	Cost, taking Gas at 3s. per 1000 Cubic Feet.
			£ s. d.
267	Fishtail	2436	365 8 0
80	Welsbach "C" burner	511	76 13 0
14½	Intensified	265	39 15 0

For places where high-power lights are required, this system is probably the most efficient and cheapest form of lighting in the market at the present time.

Professor Silvanus P. Thompson, in his Presidential Address before the Institution of Electrical Engineers, expressed the opinion, with reference to the relative merits of electric and gas lighting, that the competition between the two had been rendered very severe by the improvements introduced in the incandescent system of gas lighting. There is no doubt of this, whether in regard to internal illumination or public lighting; and it is a noteworthy fact that municipalities who possess their own electricity undertakings are largely adopting the newer system of gas for public lighting. The principle that better lighting effect can be obtained by placing lights of lower potentiality at short distances, than by employing lights of high potentiality placed at great distances apart, is now being recognized as the more scientific and practical method of obtaining the best results.

It is impossible to over-estimate the value of the gas-meter; for without it, probably the use of gas would not have attained its present vast development. Introduced about the year 1815, it has been so improved upon that to-day it is acknowledged to be a highly scientific piece of mechanism. Notwithstanding the many desperate attacks made upon it, the gas-meter is a useful and willing servant, if properly handled. Evidence in this respect is not wanting, from the popularity which has attended the introduction of the penny-in-the-slot meter. This invention has opened up a new and wide sphere of influence for gas; and it is extraordinary what a hold it has now got on the public. Mr. George Livesey, in his evidence before the Select Committee of

the House of Commons, in June, 1899, stated that, whereas the South Metropolitan Gas Company had only 439 slot meters in operation in 1892, the number had risen to 80,115 in 1898. It was estimated that, when this system was first started, there were some 90,000 houses in their district where no gas was used. Of these, over 80,000 had since been fitted up with the necessary internal fittings, gas-pipes, slot meters, &c., complete; and out of this number, 62,845 were supplied with stoves. The average cost of fitting up an ordinary house was a little over £6 (exclusive of the cost of service-pipe and everything outside the house); so that something like half-a-million of money had been expended, since 1892 alone, in the fitting up of workmen's dwellings. The average consumption by the slot meter was about 16,000 cubic feet per annum—rather more where there is a gas-cooker, and less where that article was absent. In my own case, from the time I fixed the first meter, in 1892, the system has continued to gain in favour, and the demand, although no very special effort has been made on our part, has grown to an extent least anticipated. We have now over 600 of these meters in operation, giving entire satisfaction to the consumers.

There is no doubt whatever that this system has supplied a long-felt want among the weekly wage-earning portion of the community. It is simple in its operation; and as the gas can be procured in small quantities, it fits in well with the pecuniary arrangements of this class, and is appreciated by them as affording a cheap, reliable, and safe way of securing the comforts of light and heat. The bread winners can shut up their houses, go to their work, and on returning home all that is necessary is to put a penny in the box, turn on the gas, light the cooking-stove, and obtain a good, comfortable meal at short notice. More recently we have followed in the wake of others, by fitting up cottage houses with slot meters, internal fittings, a corkslide pendant, one or two brackets, and a griller or boiling burner at the option of the consumer. This system has developed to such an extent that we have recently fitted up 187 houses, and have orders on our books for about another 50. We are proposing to make a further advance by introducing the slot-cooker system. Every endeavour should be made to increase the gas consumption per house, for by so doing the capital charges are thereby correspondingly reduced. In addition to the above, we give away to any consumer who applies a boiling ring or griller, 5 or 6 feet of india-rubber tubing, and a double tap to fit on the gas-bracket. Since the introduction of this system, we have supplied 900 boiling burners and grillers free of cost.

I hold the opinion that these slot consumers will continue to be a profitable class; and seeing they pay cash, and thus reduce the risk of bad debts to a minimum, they ought to be put on the best possible terms in regard to price. I venture to predict that the day will come when few houses will be without gas, either for lighting, cooking, or heating purpose—a system which will bid fair to a solution of the smoke problem. The hiring-out of gas cooking and heating stoves is another branch of our industry which has grown by leaps and bounds, and has aided very materially in increasing the demand for gas during the daytime. In 1892, there were only some thirty gas cooking-ranges in use in Kendal; now there are 362 in operation, consuming between 10 and 11 per cent. of the total output of gas.

The following table gives our day and night consumption per month. Column I. is for the year ending March, 1893; Column II. for the year following the gas exhibition, held in May, 1895; and Column III. for the year ending March, 1899:—

Kendal Corporation Gas-Works—Gas Consumption in Cubic Feet.

Month.	I.—1893-4.		II.—1896-7.*		III.—1898-9.		Percentage Increase for Six Years ending March, 1893-9.	
	Day.†	Night.†	Day.	Night.	Day.	Night.	Day.	Night.
April	549,200	2,169,100	653,300	2,248,200	1,358,400	2,725,200	147·4	25·6
May	567,800	1,678,000	658,800	1,723,600	1,198,900	2,080,200	111·1	23·9
June	502,600	1,232,400	549,300	1,163,000	1,191,200	1,425,100	137·0	15·6
July	569,700	1,229,300	557,100	1,279,100	1,285,000	1,924,700	125·5	56·5
August	550,700	1,796,000	603,800	1,472,000	1,262,300	2,225,200	129·2	23·9
September	712,500	2,514,500	606,900	2,498,400	1,389,000	2,926,300	94·9	16·3
October	1,131,900	3,263,200	1,314,800	3,288,400	1,982,900	3,706,600	75·2	13·6
November	2,147,000	3,311,200	2,186,000	3,339,200	3,210,200	3,926,700	49·5	18·6
December	2,560,400	3,443,500	2,840,600	3,517,600	4,243,100	4,319,000	65·7	25·4
January	2,436,100	3,437,900	2,721,200	3,572,700	3,744,300	4,262,800	53·7	24·0
February	1,413,100	3,106,700	1,870,700	3,189,000	2,418,200	3,836,800	71·1	23·5
March	889,600	2,926,200	1,095,700	2,579,300	1,747,500	3,669,600	96·4	25·4
Total	14,030,600	30,108,000	15,658,200	29,870,500	25,031,000	37,028,200	78·4	22·9

* Year after gas cooking exhibition. † Day, 6 a.m. to 6 p.m.; night, 6 p.m. to 6 a.m.

This table shows the important part played by all gas apparatus and appliances designed to meet the day-load, and how important it is to use every endeavour to encourage demand under this head.

The development of gas for other than domestic purposes is none the less important. In many of our arts and manufactures, gas is now an indespensable commodity; and it is a noteworthy fact that many trades have been enormously simplified and perfected, the production cheapened, and labour lightened, solely through the medium of coal gas. As a means for producing motive power, gas has of late years made great strides. So great has become the demand for gas-engines, that the users of them may be ranked among our most extensive and profitable class of consumers. The development of the gas-engine is undoubtedly one of the advances of the century, and the demand is constantly on the increase. Messrs. Crossley Bros. inform me that they make fifty different types and sizes of engines, varying from ⅓ up to 500 horse power, and that they turn out regularly no less than 60 to 65 per week—equivalent to more than one engine per working hour. During the last 30 years, the consumption of gas has been reduced from 30 to 15 cubic feet per brake horse power. At the present time, there are sixty gas-engines in operation in Kendal, consuming 5 million cubic feet of gas per annum, equal to about 9 per cent. of the total output.

In order to encourage the use of gas-engines, I am of the opinion that gas authorities should be prepared to let them out on the continuous hire system, or on the hire-purchase system. Such a scheme would meet a long-felt want, and would prove a boon to small traders, as well as a source of profit to the authorities. In Cork, the hire purchase system has been in successful operation for some years.

Mr. T. P. Travers, Engineer and Manager of the Cork Gas Company, has very kindly furnished me with some particulars of the system adopted by his Company. They take the net cost of the engine (about 20 per cent. off list price) and spread it over three annual payments; but, in addition, they charge 5 per cent. on the amount due at the commencement of each year. For example, suppose the list price of the engine to be £100, the net price would be (say) £80, then the customer pays:—

		£		£ s. d.
First year $\frac{80}{3}$	= £26 13 4	+ 80	at 5 per cent.	= £4 0 0 — 30 13 4
Second year $\frac{80}{3}$	= £26 13 4	+ 54	at 5 per cent.	= £2 14 0 — 29 7 4
Third year $\frac{80}{3}$	= £26 13 4	+ 26	at 5 per cent.	= £1 6 0 — 27 19 4
	£80 0 0			£88 0 0

The necessary legal agreements are drawn up and signed by the parties; and, in addition, a large brass plate is attached to the holding-down-bolts of the engine, with prominent letters thereon stating: "This engine is the property of the Cork Gas Consumers' Company."

I am glad to be able to congratulate Mr. J. F. Wicks, Engineer and Manager of the High Wycombe Gas Company, on his enterprise in taking up the initiative in this country. Mr. Wicks has kindly furnished me with the following particulars of the system adopted by him. In order to render every facility to the manufacturing public and other businesses where motive power is desired, his Company are prepared to supply gas-engines, either on the hire-purchase system, payment quarterly, or on the continuous hire system. No fixed scale of prices is formulated, as in each and every case the circumstances vary, and require different estimates, as they not only supply the engine, but also fix all complete with foundations. Although the system has only been in operation a short time, five engines, varying from 4 to 25 horse power nominal, have been fixed; while he has inquiries for twelve others. At the time of writing, an engine of 75-horse power (the largest that has been fixed in the district) was being erected. The five engines already fixed are estimated to return an increased revenue of some £500 per annum.

To the electrician, the question of increasing the day-load is of paramount importance; and in order to achieve this end, some

authorities have adopted the system of hiring-out motors. The Bradford Corporation, for instance, have done so in regard to their electric undertaking. Through the kindness of Mr. A. H. Gibbings, the City Electrician, I am able to place before you a few particulars of the system now in operation in that city.

Electric motors from ½ to 10 brake horse power may be obtained on hire at the following rates:—

Brake Horse Power.	Approximate Speed.	Volts.	Ampères.	Rental per Annum.
				£ s. d.
½	1700	230	2	1 10 0
1	1450	230	3½	2 0 0
2	1200	230	6½	2 10 0
3	1100	230	9½	3 0 0
4½	1000	230	14½	4 0 0
6	800	230	19	5 0 0
7	800	230	22½	6 0 0
10	800	230	32	8 0 0

The supply of the motor and the current are subject to the Board of Trade regulations relating to electricity supply; to the rules, regulations, and conditions of the Electricity Department of the Corporation; and to the Electric Lighting Acts, 1882-1889. The charges for electricity supplied for motive power to users satisfying the department as to the continuous running of their motors through the working hours of the day, is at the net rate of 1d. per unit. For motors used for cranes, hoists, and similar purposes, the charge is at the rate of 2d. per unit. In Cork, the Electricity Company supply motors on free trial for two months, and afterwards let them on hire at an annual rental based upon 10 per cent. of the cost.

The importance of this subject cannot be passed over lightly; and it is quite evident that if gas authorities are to hold their own, it behoves them to be on the *qui vive*, and to be prepared to offer to their clients similar facilities in regard to gas-engines as the electricians are doing in respect to electric motors.

It is satisfactory to note that the residuals market has materially improved during the past year. Tar now stands fairly high; and as coke is likely to be scarce, the price will no doubt remain firm. Sulphate of ammonia has shown a marked improvement. I have said so much about sulphate of ammonia on previous occasions, and you are all so familiar with my contributions to the literature on this subject, that little remains for me to say. When I tell you, however, that the three principal crops of this country—viz., wheat, oats, and barley—could do with all, and even more than all, the sulphate of ammonia that is produced in the United Kingdom, and, moreover, if the 21 or 22 millions of acres of land under cultivation received only ½ cwt. per acre (a very moderate dressing) it would require more than three times the present production of the whole country, you will form some idea of the value of this fertilizer. In spite of this fact, more than one-half of the amount produced is exported to the Continent, and nitrate of soda is imported to take its place.

The question of enriching coal gas by means of benzol merits the fullest consideration, as any extended use of this material would have an important bearing upon the future of the tar market. Colonel S. A. Sadler, in his Presidential Address to the North of England Association of Gas Engineers, in 1894, said: "Ordinary coal gas at normal temperatures will easily carry 3 per cent.; this being nearly the point of saturation. Now, as an average gas contains less than 2 per cent.—often only 1·5 per cent.—1 per cent. may be added with great advantage where increased illuminating power is desired. An addition of 1 per cent. will raise 14-candle gas to 22-candle power—which, at to-day's price of crude benzol, would cost about ½d. per candle. For enriching gas, benzol is three times better than carburine, and four-and-a-half times better than ordinary petroleum spirit. If all the gas made in the United Kingdom were enriched by 1 per cent., it would require 11½ million gallons of benzol to do it—a quantity more than twice as great as the whole world's yearly production."

Mr. Hunt found that 0·105 gallon of almost pure benzol was required to increase the illuminating power 1 candle per 1000 cubic feet of coal gas. Dr. Bunte has stated that 15 or 16 candle gas required for an increase of 1 candle, 2000 to 2500 grains of benzol per 1000 cubic feet. Mr. J. F. Bell, of Stafford, found that the addition of 1 per cent. of benzol vapour was sufficient to raise the illuminating power of 14-candle gas to 22 candles; and it was also found that 0·05 gallon of "nineties" benzol raised 1000 cubic feet of 15-candle gas to 16 candles. Coal gas of 15-candle power was raised to 20·27 candles by the addition of benzol in the proportion of 0·0426 gallon per 1000 cubic feet per candle raised. This gas was mixed with other coal gas, and the mixture calculated to be 17·47 candles. It tested at the works 17·25 candles; and a distance of half-a-mile from the works, 17·32 candles. Assuming 0·05 gallon to be required per candle per 1000 cubic feet of benzol costing 1s. per gallon, then the cost of enrichment is 0·6d. Mr. W. Irwin has stated that, with benzine at its present price, there is no source of enrichment, whether water gas, cannel coal, or any other material, which can at all compare with it on the grounds of economy and efficiency in every respect. He found that a gallon will raise 10,000 cubic feet of 16-candle gas 3 candles, as tested with the union-jet burner, and 1·3 candles when the argand burner is employed.

Our ex-President, Mr. Shadbolt, has demonstrated that there are valuable hydrocarbons, which at present go to the tar distiller, capable, by simple and inexpensive means, of being profitably retained by the gas. To those who wish to make a study of the enrichment question in all its bearings, I would strongly recommend them to peruse the able and interesting paper contributed to the Institution of Civil Engineers by Mr. Holgate, of Halifax.*

I desire to offer a word of congratulation to the members of the Manchester and District Junior Gas Association upon the success of their organization. The Association has unquestionably supplied a much-felt want among the younger members of our profession; and its good influence will, I am sure, have a beneficial and stimulating effect upon its members, and ultimately upon the gas industry generally. We extend to them our very hearty support and best wishes for a useful and prosperous career.

I cannot close without expressing the hope that the time is fast approaching when the amalgamation of the Incorporated Gas Institute and the Institution of Gas Engineers will be an accomplished fact. It is much to be regretted that the relationship between these bodies, who have but one common object in view, should remain strained. I am yet hopeful that wisdom and common sense will prevail, and that ere the new century opens upon us, a solution of the vexed question will be found which will be acceptable to both parties, and that we shall again stand as one united body representative of our great and time-honoured industry.

Gentlemen, I again thank you most heartily for the honour you have conferred upon me in placing me in the position of President of this Institution; and I trust you may one and all have a very Happy and Prosperous New Year.

Mr. HUTCHINSON moved a hearty vote of thanks to the President for his valuable and painstaking address. He had gone very fully into all the passing events of the day, and his address was in every way an excellent one. The honour of the Institution was very safe in the hands of their new President.

Mr. W. PRINCE (Stoke-on-Trent) remarked that the President had treated the subject of gas manufacture and distribution in a masterly manner, and had dealt with it most exhaustively. The members of the Institution would derive much benefit from a careful perusal of what he had written. It contained much sound matter, collected with tact and judgment. He seconded the resolution.

Mr. ISAAC CARR said, though the address was of considerable length, personally he should have liked it to be longer. The President referred to the cost of electricity per unit. He told them it was supplied at 1d. during the day-time and 2d. during the evening. Their friends the electricians were fond of comparisons, and always to the disadvantage of gas. He had been considering what price electricity would have to be supplied at to compare with the gas-engine at the lowest price at which gas was supplied in England. In an engine working, as the President had told them, with 15 cubic feet of gas per indicated horse power, a pennyworth of gas at the present lowest selling price would develop over 5-horse power per hour; and a unit of electricity at 1d. would only develop 1¼ indicated horse power. They would thus see that electricity, to compare with the cost of gas, would have to be sold at ¼d. per unit; so that they in the gas industry had something "up their sleeve" yet. He endorsed everything that had been said as to the general usefulness of the address. The President deserved the hearty thanks of the Institution for the trouble he had taken in preparing it.

The PRESIDENT, in responding, said he trusted that the figures and other information he had given would be of some little use to the members, He might also suggest that it would be appreciated by the members if Mr. Carr would on some future occasion come forward and give them the benefit of his experience on the question of gas *versus* electricity. He concluded by moving a vote of thanks to Mr. Shadbolt for his services in the chair during the past year. It was, he remarked, almost unnecessary to say anything in praise of their late President, who was well known to all, both for his ability as a gas engineer and in a thousand and one ways with which they were all familiar. He (Mr. Ritson) had an onerous duty to perform in following such a good man. Mr. Shadbolt had given an enormous amount of energy and time to the work of his office, with a view of carrying out the wishes of the members in a satis factory manner.

Mr. WOOD seconded the motion, and remarked that they had not for a long time had a President who had worked harder than Mr. Shadbolt.

Mr. SHADBOLT, in responding, said the members had supported him right loyally during his term of office. The work had been a pleasure to him; and his election to the position had reflected honour upon him. Thus, strictly speaking, he thought they were more deserving of his thanks than he of theirs.

On the motion of Mr. KENDRICK, seconded by Mr. HAWKINS, a vote of thanks was accorded to the retiring officers and members of Committee for their services during the past year.

The PRESIDENT briefly acknowledged the vote; and the business proceedings then closed.

* "Minutes of Proceedings, Institution of Civil Engineers," Vol. CXXVII., pp. 277-311; also "JOURNAL," Vol. LXX., pp. 528, 584, 633, 679, 739, 792, 844, 897.

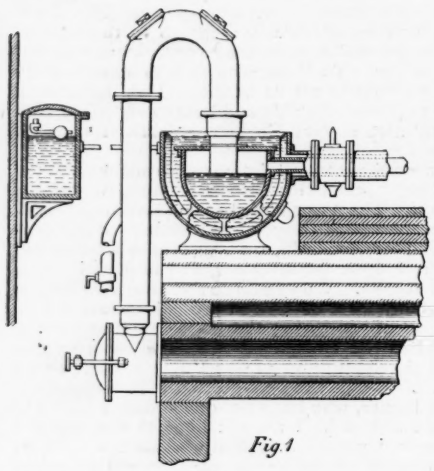


Fig 1

WATER-CLAD HYDRAULIC MAINS, COAL BUNKERS, &c.

In December last a patent was taken out by Mr. H. J. Robus, of Mansion House Chambers, Bucklersbury, E.C., for an invention designed to keep cool and regulate the temperature of hydraulic and foul-gas mains and "other pipes and vessels situated above retort-settings in gas-works," by means of an automatically controlled water-jacket. The patentee even contemplates supplying a water-jacket for cooling purposes to the bottom, and (if desired) to the sides of coal bunkers, which could then be placed directly above the retort-setting.

In his specification, the patentee points out that the hydraulic main is usually placed above the retort-setting, and is screened from the intense heat of the furnaces by several layers of brickwork. This involves placing the main at a considerable height above the retorts; and even then "the heat is objectionable, as it bakes the tar in the hydraulic main, and causes it to clog both there and in the tar and liquor main." By means of his invention, however, the hydraulic main can be placed closer to the furnaces; and the ascension-pipes are thus reduced in length. This shortens the path of the gas from the retorts to the hydraulic main, and thereby lessens the amount of tarry deposit in the ascension, arch, and dip pipes, and the hydraulic and other mains, and should tend to prevent the clogging or choking of these pipes. By controlling the flow of water through the jacket of the hydraulic main, it is also possible to "regulate the temperature of the main so as to ensure the best temperature being maintained." Further, the lowering of the hydraulic main —by reducing the length of the ascension-pipes and the necessary height of the retort-house—would allow a considerable saving in first cost of the installation.

Fig. 1 is a sectional elevation of a horizontal retort-setting, with the hydraulic main and foul-gas main fitted in accordance with the invention. Fig. 2 shows an inclined retort-setting with the hydraulic main, foul-gas main, tar and liquor main, and coal bunker all so fitted.

As shown, the hydraulic main is enclosed in a jacket, supported at intervals inside the jacket by props. The dip-pipe passes in the usual manner through the cover of the hydraulic main, and dips beneath the surface of the tar and ammoniacal liquor. Water is supplied to the jacket from any ordinary type of supply tank—the water-level in the supply tank being controlled by a floating ball-valve or other suitable means. The pipe to take away the water from the jacket may join it near the bottom, as in fig. 2, or it may draw off the water from near the top of the jacket at the side remote from the feed-pipe.

The foul-gas main leading from the hydraulic main may also be jacketed as far as necessary, and likewise the tar and liquor main, if such a main is used. The foul-gas main with its jacket is shown in both figures; while a tar and liquor main with a jacket is shown in fig. 2 only. These jackets may be connected to the jacket of the hydraulic main as shown in fig. 2, or they may be separate and have their own inlet and outlet pipes similar to those of the hydraulic main.

The coal bunker above the inclined retort-setting may also be jacketed at the bottom, as shown in fig. 2, and at the sides likewise, if desired.

A cock is attached to the outlet-pipe of the water-jacket, so that, by regulating the outflow of the water, the hydraulic and other water-jacketed mains may be maintained at any suitable temperature. The patentee says he considers it "important that means should be provided for regulating the temperature of the hydraulic main, as it is as hurtful to have too low as too high a temperature. By this device, any desired temperature may be maintained in the mains. The water from the jackets may be used to slake coke; and, therefore, need not be wasted."

We have received from the Technical Publishing Company, Limited, of Manchester, "The Practical Engineer" Electrical Pocket-Book for 1900.

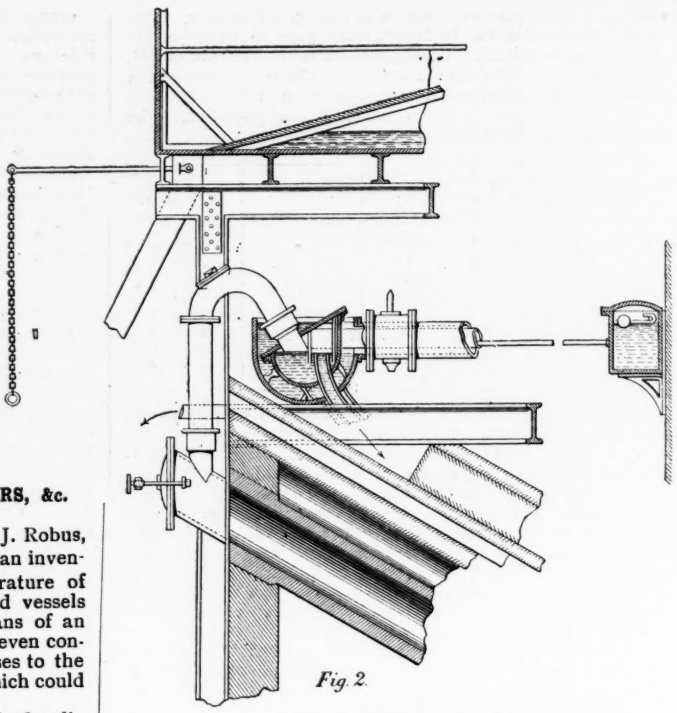


Fig. 2.

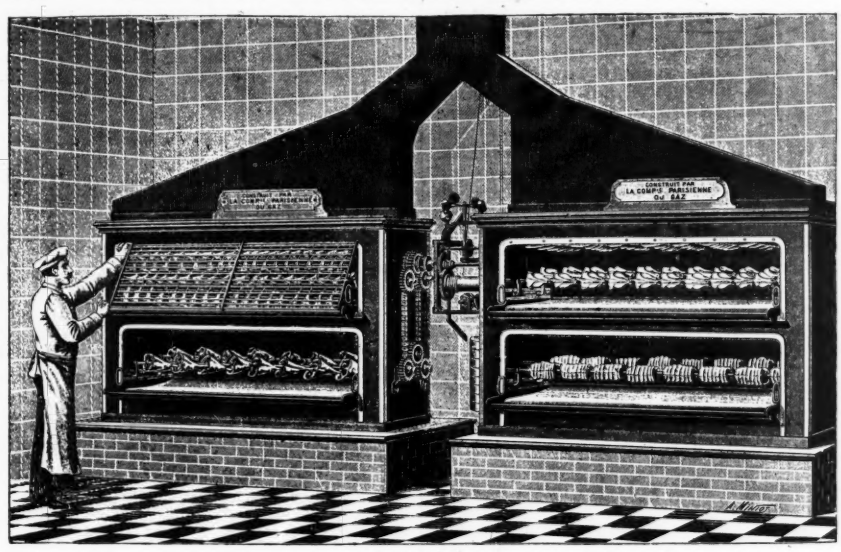
THE JASPER MANTLE.

Reports of trials made with this mantle, which is produced at a chemical works at Bernau, in Bavaria, indicate that it is far stronger and tougher than ordinary incandescent gas mantles, while its photogenic duty appears to be as high. The trials to which we allude were made in the presence of Dr. H. Lux, Editor of the "Zeitschrift fur Beleuchtungswesen," and of a representative of "Der Metallarbeiter," and they are described in recent numbers of those journals.

In the first instance, an English "Hill" Welsbach mantle was submitted to shocks on a specially devised stand, which was raised to a height of 0·4 inch, and then allowed to drop freely. The burner, on which the mantle was supported by the usual magnesia prop, was mounted upon a heavy cast-iron upright attached to the stand. The stand was raised and dropped about 50 times per minute, so that a large number of violent shocks could be rapidly conveyed to the mantle under trial. The Welsbach mantle split just below the loop attachment, as soon as it had suffered three shocks on the stand. A Jasper mantle was then placed on the burner in its stead; and the stand was raised and dropped 150 times. The mantle was several times jolted right off its supporting prop by the severity of the jars, and then fell on the indented edge of the gallery of the burner. Its bottom edge was slightly torn thereby; but otherwise the mantle appeared uninjured by the falls sustained. It was next put on a second stand, and submitted to 100 shocks of rather less severity. As these had no appreciable effect on it, it was removed from its prop, and stood on its lower edge within the chimney on the stand, which was then raised and dropped some 25 times. The lower edge was thereby broken away for about $\frac{1}{10}$ inch. The mantle was afterwards placed on its top and on its side, and similarly submitted to a number of shocks. At the conclusion of this severe trial, it was found that the only material injury suffered by it was that the mesh was torn in one spot near the base of the mantle, for a length of about $\frac{1}{2}$ inch. After these extraordinarily severe tests, the mantle was mounted on the burner; and observations were made on the photometer of the light afforded by it. It was found that, for a mean consumption of about 3·7 cubic feet per hour under a gas pressure of 14-10ths, the light was equal to 95·4 Hefner units, or 83·7 English candles. Clearly, therefore, the mantle afforded at least as high a photogenic duty as an ordinary mantle, which would not have withstood comparatively slight vibration.

The Jasper mantle on which these tests were made was drawn from stock by the Press representatives, and was incinerated and lighted in their presence before the trials. It was therefore not a specially prepared mantle. Tests of the durability of the mantle, and of the light afforded after many hours' use, are being conducted at the Physical-Technical Institute at Charlottenburg; and we hope to be able later to give the results.

The month of January, 1900, will show the highest record made for any one month in the history of the American coke trade. Nearly 500 new ovens were added to the list of ovens recently, increasing the number in the Connellsville region to a grand total of 20,072 ovens, the highest ever reported. This is an increase since Jan. 1, 1897, of nearly 2000 ovens.



LARGE GAS ROASTER AT THE POLYTECHNIC SCHOOL, PARIS.

A LARGE GAS ROASTER.

The current number of "Le Gaz" contains an illustration of the large gas roaster which the Paris Gas Company have fitted up at the Polytechnic School, to which special reference was made by the Directors in their last report. It is capable of roasting at one time 64 legs of mutton or 100 chickens, or grilling 250 chops. It is constructed in two sections, with the turnspit mechanism in the intermediate space. It has been in operation since October, 1898, with in every way satisfactory results. In a trial of the apparatus, the weight of meat before cooking was 171 lbs.; after, cooking, 158½ lbs. The meat therefore lost only 12½ lbs. in the operation, which lasted 1 hour and 25 minutes. The consumption of gas was 770 cubic feet, the cost of which, at the Paris price of 6s. 9d. per 1000 cubic feet, amounted to rather less than 5s. 2½d. With the old method of roasting by wood, the cost of the fuel would have been 9s. 7d.; and the meat would have lost considerably more of its weight in cooking, than it did with gas. The excellent working of the apparatus since its installation demonstrates the practicability of roasting on a large scale by gas; and apart from the greater cleanliness and convenience of this fuel in comparison with wood or coal, the figures given above show distinct economy in expenditure.

NATION'S WATER SUPPLY AND ITS EFFECTIVE CONTROL.

As mentioned in last week's issue, there was only one subject down for discussion at the half-yearly meeting of the British Association of Water-Works Engineers; but being one of universal interest, and many authorities of great and minor degree being concerned in it, it was prolific in discussion. Several authorities and societies had been invited by the Council to send representatives for the purpose of eliciting their views on the question; and among those present were delegates from the County Councils Association, the Urban District Councils Association, the Association of Municipal and County Engineers, the Society of Engineers, the Corporation of Huddersfield, the Geological Society, the Sanitary Institute, and the Institute of Sanitary Engineers. The subject was introduced by Mr. C. E. JONES, Assoc.M.Inst.C.E., in a paper which for terseness and point could not have been surpassed. Before the paper was read, the President (Mr. William Watts, the Engineer of the Little Don works of the Sheffield Corporation) disclaimed, on behalf of the Council, all responsibility for the views which might be expressed by the author or any gentleman taking part in the discussion; the simple object of the paper being to elicit the feeling on the subject of those present.

Mr. JONES read his paper, of which the following is practically the full text:—

No apology is needed for inviting the attention of the Association to a subject of such vital importance as that of the control and supply of potable water to the growing population of this country. The amount of capital expended upon water-works is enormous, and steadily increasing. Engineering works of great magnitude and efficiency, skilful design, and substantial character, have been constructed in all directions, furnishing a remarkable index of progress in this Victorian era.

In consequence of the rapid growth of towns, both in number and size, with increase of trade and expanding commerce, water is in greater request, and must be provided in ever-increasing quantities. At the same time, it is more recklessly consumed; and, as might be expected, waste leads to scarcity, usually at a season of the year when rain is absent. A disregard of the injunction, "Waste not, want not," is followed by consequences alike retributive for us and posterity. Water, the value of which is often under-estimated, should be supplied copiously, but not wastefully, apportioned with care, under just and wise control, having a single eye to the national benefit, which is in this case synonymous with Imperial control.

In the author's opinion, effective control can best be secured by the creation of an independent expert National Water Board, whose appointment should not be influenced by the passing politics of the hour, or the local feuds which periodically agitate county, municipal, rural, urban, and other elective bodies. It is only human, after all, that local interests and unwarranted apprehensions should influence and often dominate local judgment at the expense of what is best for the country at large. Hence arises the question, Are the local water authorities, as at present constituted, so qualified, either by independence of position or from their technical knowledge, as to justify their being considered able and impartial bodies, fit to be entrusted with the sole administration and future development of the national water supply? The writer fears that the answer must be in the negative, and that we must seek elsewhere for the means of efficient control.

Under the existing system of local administration, much good work has been done; and some communities are well supplied. But this observation is by no means applicable to all; and a prolonged drought soon reveals the weak places, where the miseries of a short supply have to be endured. With the return of copious rain, contemplated improvements are frequently postponed, for financial or other reasons, to a more convenient time; and a recurring drought witnesses a renewal of broken promises, with assurances of immediate reformation. The want of continuity of policy exhibited by existing water authorities is largely attributable to the mode of their election to office, and the short periods for which individual members frequently serve—some elections actually taking place yearly; while fits of extravagance as well as of economy afflict our local bodies to a serious extent.

The coupling up of distributing-mains and other apparatus in contiguous towns or systems should, wherever reasonably practicable, be made compulsory in view of possible accidents, temporarily restricted supply, or other unforeseen exigencies; and, judging by past experience, it seems hopeless to expect that this combined action will ever be attained except it be insisted upon by some duly constituted central authority. It took the London Water Companies half a century to recognize the value of intercommunication; and even then the pressure of a State Department had to be invoked in order to enforce its adoption.

Strange to say, there appear to be scattered over the country too many separate water authorities, each studying only its own interests. Many of these could be advantageously combined for purposes of water supply conformable to the physical configuration of the district, and the peculiar or special requirements of the locality. What is there to prevent a combination of all the Metropolitan Water Companies; or, speaking generally, of undertakings drawing supplies from the same source, and serving adjoining areas? The reconcilement of conflicting vested interests is surely not impossible! Such an amalgamation would tend to economy in administration, conservation of water would tend to the reduction of waste, and would secure something approaching uniformity in the supply, water-rates, charges, and regulations; it would also lessen the risk of water famines, and remove the causes of complaints of consumers, who pay for what

they do not always get. These objects are well worthy of attainment; and the question is, Who shall begin the work?

The monopolization of gathering-grounds by powerful and wealthy corporations is a growing evil, fraught with peril to smaller communities, and demands without delay the attention of the Legislature. In parliamentary warfare the longest purse generally finds Providence on its side, and secures powers and concessions denied to less influential and poorer communities. Central control is needed over all gathering-grounds, whether appropriated or not; and protection should be afforded to interested but weaker bodies or individuals, to whom the cost of opposing Bills in Parliament is prohibitive, if not absolutely ruinous. There are authorities having more gathering area than they utilize who, like Oliver Twist, but with less reason, ask for more, presumably to save the outlay that the construction of impounding reservoirs would necessarily entail. Others possess so much in excess of actual or maximum requirements that one-twentieth part of the rainfall suffices for all their purposes, and the surplusage is probably wasted; while, on the other hand, some have to purchase water in bulk from their more fortunate neighbours, in order to eke out the scanty supply to their own consumers.

The Metropolis, with a wholesome and abundant supply near at hand, is threatened with a scheme involving an expenditure of many millions sterling for tapping the Welsh lakes, because it is thought that the consumption *may possibly* overtake the supply some 40 or 50 years hence, upon the assumption that Greater London grows as fast in the future as it has in the past. The provision of additional storage capacity in the present watersheds, so as to assist the ordinary sources of supply during the summer and autumn months of least rainfall, would relegate schemes of this character to the dim and distant future.

What, however, is imperatively required is the allocation of gathering-grounds and other sources of supply, not exempting underground waters, on national, comprehensive, and equitable principles, independent of all selfish, aggressive, or local interests. It is obvious that, under the present system of procedure, this is not reasonably possible; and a new power must be requisitioned to achieve such a result and unravel the Gordian knot of water supply. The needs of civilization, of the commonweal, demand that the old order of things should give place to a new; and the author, with all deference, entertains the belief that the case would be met by the establishment of such a Central Water Board as he herein foreshadows. The efficiency of the new tribunal will depend upon the character and special qualifications of the members composing it, wherein consists the *crux* of the whole thing.

The proposed National Water-Works Board should consist of representatives of the law, geology, hydraulic engineering, chemistry, and meteorology; being at the same time practical and proficient men of sound judgment and common sense. Its jurisdiction might include the control of all fresh-water streams, rivers, watersheds, and other sources of supply not already committed to the care of Conservators. Among many other useful functions it could perform would be the allocation of the few unappropriated gathering-grounds, and the division and re-allotment of such as are not fully or advantageously utilized, and the apportionment of water on just and equitable principles to such places as are entitled to participate in the benefits of each particular source.

Powers of entry and inspection, authority to call for information, reports, returns, and analyses, and to receive evidence on oath, and to direct prosecutions for polluting water, should be within its sphere of operations. The appropriation and allocating of what is fair as compensation water, determining mean local rainfall, and the grave question of protecting areas from pollution, might be relegated to, and determined by, the Board, who in cases of dispute should decide and define the areas to be supplied by overlapping and competing undertakings, and secure, where desirable, intercommunication between the trunk mains and works; while joint schemes of supply, and even the amalgamation of existing undertakings, could be formulated and carried into effect by its means. Present well-managed Boards should be allowed to continue, and all indubitable rights be preserved intact where not proved to be inimical to public welfare. But new schemes for the acquirement of additional supplies should be submitted to, and receive the sanction of, the Central Board before being allowed to proceed. Aggressiveness on the part of wealthy and powerful bodies would thus be checked or receive its quietus; and the number of crude or unnecessary water projects be materially reduced.

A court of appeal, well worthy of public confidence, would thus be brought into existence; and being easily accessible, and eminently capable of expeditiously deciding all technical questions relating to water supply submitted to its judgment, its institution could not fail to benefit the public, as well as water undertakings themselves, by reducing to a system the many intricacies, customs, practices, and privileges of the purveyors of drinkable water.

The public advantages resulting from the effective national control of the water supply are so apparent to the author that they seem indisputable, and he ventures to hope that the discussion will result in the Association taking some steps to urge the necessity for the creation of an independent and impartial tribunal for the purpose of dealing with the many-sided question of water supply on the lines he has thus briefly and imperfectly, but earnestly and honestly, indicated. The continuation of the present system, or rather want of system, is clearly undesirable, wasteful, inelastic, and liable to gross abuse. Its perpetuation will assuredly render "confusion worse confounded," and should by some means be once and for all rendered impossible.

Discussion.

The discussion was of a somewhat prolix character, and was of from four to five hours' duration. Many of the speakers departed widely from the definite channel into which Mr. Jones had striven to direct the consideration of the subject. But while they did so, we are compelled, by the claims of other matter, to limit this notice to the views expressed on the central point.

The SECRETARY (Mr. Percy Griffith) read two letters which he had received in reference to the paper. The first was from Mr. C. de Rance, who stated that he agreed with every word of the paper. He rejoiced that the views he had taken up for nearly thirty years should be supported in principle by a member of the Council of the Association. Dr. J. C. Thresh wrote that he did not find himself in entire accord with the author; but his views differed more in detail than in principles. He thought that public water supplies varying in magnitude from a shallow well to immense works, a Central Board could scarcely control all. The staff required would be large and costly, since it would be worse than useless if it did not include men of the very highest standing and reputation. In Dr. Thresh's opinion, a more radical change was desirable. The present Local Government Board, with its multifarious and conflicting duties, should be abolished; and in its place there should be a Poor Law Board, confining the whole of its attention to the poor laws, and a Public Health Board (with a Minister), taking over all the public health functions of the Local Government Board, and having the powers which Mr. Jones suggested should be given to the Central Board—exercising supervision over water supplies, and reporting upon all schemes requiring the sanction of Parliament or the consent of the Board to borrowing powers. The duties and responsibilities, too, of County Councils with reference to the supplies of water to all small towns and rural districts should be greatly increased, making them responsible for seeing that all such districts had a reasonable supply of wholesome water. When both District Councils and County Councils were in default, the Public Health Board should at once exert authority. With reference to control over unappropriated watersheds, and over existing water-works generally, there was a general concensus of opinion that such was urgently required, but control over unappropriated underground water was equally imperative.

The PRESIDENT thought that most water-works engineers would agree that some efficient supervision should be exercised over drainage areas by a legal and properly constituted body; but with what powers this body should be invested to satisfy the claims of cities, towns, and villages seemed to him a problem not easy to determine. A national or provincial governing body would be sure to deal more justly and unselfishly with the claims of all the water consumers in a prescribed hydrographical basin than a powerful corporate body having its own wants and interests to satisfy first, although there were some honourable exceptions to this rule, which, of recent years, Parliament had recognized. Mr. de Rance suggested some time ago that the control of the rivers, and necessarily the watersheds, should be invested in the County Councils in whose districts such rivers flowed and drainage areas existed; and he (the President) was not sure whether this plan would not be a wise one to adopt, having a National Committee of Appeal in case of dispute where the interests of two counties clashed regarding the confluence of rivers and their tributary feeders. One object of the Association, it seemed to him, was to suggest that suitable men be appointed to advise on a broad basis the claims of corporate bodies to a particular watershed, such men to be practical engineers having had a proper training in the department of hydrology and meteorology to justify their appointment and sanctify their opinions. It should be seen that the rain falling upon the watersheds was properly utilized; and while every corporate body had sufficient for its immediate, and in a measure its prospective, wants, flood water should not be wasted and allowed to flow uselessly to the sea. He also remarked upon the fact that engineers did not seem to have any well-defined rules to guide them in utilizing a drainage area to the full extent. Something, he thought, should be done to compel corporate bodies to exhaust their appropriated sources before others were granted them.

Alderman E. J. HALSEY (Chairman of the Surrey County Council) said the County Councils Association, which he represented, took up this question last summer, and circularized all the authorities in the country, and asked for their opinions and any evidence they could give as to the necessities of the case. Within the last few days they had had their first meeting; and a Committee of the Municipal Association had joined them—they feeling the difficulties of the case just as much as the County Councils Association had done. They had not yet been able to formulate any scheme; but, so far as his personal opinion was concerned, he thought there would be very great difficulty and practical impossibilities in going so far as the writer of the paper indicated. However, that something must be done was quite clear. He mentioned instances of the evils which existed, and then said he did not wish to see the control of water supply centralized in London, nor did he wish to see it in the hands of

too many bodies. What they wanted was an authority which should have power over a sufficiently large area to make it complete and perfect. The reconciliation of the interests of all concerned in the best possible way was the ambition of the County Councils Association.

Mr. E. K. Burstal, M.Inst.C.E., spoke at great length on the author's reference to "reckless" consumption, and quoted figures from the report of the Royal Commission on the Metropolitan Water Supply as to the excessive consumption of water in London. He said there was no reason whatever why the enormous waste which took place in London should go on. Under any circumstances, it was a standing disgrace which involved the loss of 60 million gallons of water per day, which meant £60,000 a year in pumping and filtration. The whole of this 60 million gallons had to be again dealt with by the County Council at their sewage outfall works; and yet it might be saved by efficient fittings. It was an extraordinary thing that no sustained efforts had been made to tackle this question. Mr. Jones asked whether the local authorities as at present constituted were qualified to be entrusted with the sole administration and future development of the national water supply. To a great extent, the answer to that was "No," not so much from the constitution of the authorities as from the fact that there had been so many transfers of water companies to local authorities, and then the control of the water supply was left in the hands of the borough surveyor, who was already fully worked, and had perhaps never had anything to do with water supply until the day of the transfer. It was thought that anybody could manage a water undertaking; but a greater mistake was never made. He could not agree with the proposition to couple up the mains of different authorities in contiguous towns or systems. Every district had its own system and levels; and any such action would create a great amount of confusion and difficulty. Of course, in London it was a different matter altogether. The suggestion that there should be control of underground waters was exceedingly valuable, but very difficult to carry out. If, however, Parliamentary Committees had evidence before them that an injustice would be done by any measure submitted to them, he believed they generally did what was right. Complete control of underground water would be a risky thing unless made by hydrological surveys, which was a very expensive matter. The constitution of Water Boards or Trusts was an interesting question, especially as a Board was recommended for London. Regarding this recommendation, he might be pardoned for saying that this was precisely what he and his partner (Mr. E. H. Stevenson) recommended in a little book which they published in 1892 on the question of the Metropolitan Water Supply. He hoped what they then foreshadowed would be carried out.

Mr. W. Whitaker, F.R.S., F.G.S., &c., said the author had spoken of the advantages of combination for the purposes of water supply "conformable to the physical configuration of the district." Of course, it was true there would be advantages, but they had governing bodies, and, unfortunately, their boundaries were not fixed on scientific principles, and on that account difficulties would arise. The author also asked what was to prevent the combination of the Metropolitan Water Companies. He (Mr. Whitaker) had asked the question many times; but he could never get it properly answered. There were, he knew, great difficulties—not engineering, but financial and legislative. But it was logically and utterly absurd that a great city like London should have its water supply regulated by eight independent and sometimes almost competing Companies. He did not believe they would get out of the present system in London in a hurry; and he was inclined to think that the proposed Board was never likely to come into being. He should like to say a word on behalf of the great populations who wanted water. It was the small populations who had the good gathering-grounds. Should they keep them when they did not want them? Certainly not. It was the large populations who should have the large gathering-grounds; and they should take care of the smaller populations, who, as a rule, could not take care of themselves, for the simple reason that they had not the means. In his opinion, if the Board proposed by Mr. Jones were created, it would, in two or three years, be one of the best abused bodies in the whole kingdom. They had two impartial tribunals in the House of Lords and the House of Commons; and they were so independent that one sometimes overstepped the decisions of the other. An expert tribunal was not always the best. However, he heartily agreed that something must be done; but they must go about it by degrees. Reformation, not revolution, was what was wanted.

Alderman J. Sugden (Huddersfield) thought the ideal that Mr. Jones had set before them was too high. At Huddersfield, they had spent 1¼ millions on their water rights; and they were not going to give up these rights to others without some consideration. Parliament had not given them their powers for nothing. They had fifty townships in the water area which they supplied in consideration of the powers granted them, and these townships were now better off than they were before. Although the constitution of the Committee having charge of the works might change, there was a continuity of management; for they had always their Engineer and a permanent staff to guide them.

Alderman Hirst, Chairman of the Huddersfield Corporation Water Committee, thought, if something could be done to help small places who could not help themselves in this matter of water supply, it would be a good thing.

Professor Henry Robinson (representing the Society of Engineers and the Sanitary Institute) considered the storage of flood waters, and utilizing the rainfall instead of allowing it to go to waste, formed the solution of this national question of water supply. He agreed that some controlling authority or authorities should be created; and an ideal arrangement, in his opinion, would be to map out the whole country into watershed areas after careful study. He also spoke of the want of uniformity in the decisions which different Parliamentary Committees had given on precisely similar points in Bills; and he instanced two directly opposite decisions relating to underground water.

Mr. C. H. Priestley (Cardiff) pointed out that Mr. Jones had eulogized the remarkable progress made during the Victorian Era in water-works undertakings; and he reminded him that this had been accomplished without the intervention of a Government Department. Although highly desirable that some more efficient provision should be made for the wants of many districts, and for combination by means of Water Boards, yet he (the speaker) did not believe in a Government Water Department who should have a monopoly and full control over the water supplies of the country. Englishmen generally were not so fond of giving up their individual and local rights to be controlled by a body of gentlemen in London, however estimable, learned, and highly respectable that body might be. In constructing water-works, municipalities and even small towns, obtained the aid of professional gentlemen well versed in the subject, and able to recommend the best thing having regard to the local circumstances. He admitted that there were weak spots; and deplorable negligence was often shown by many small places, and even fairly large towns. But he thought if greater power was given to County Councils, and facilities provided for amalgamation (which in many cases might possibly be made compulsory), much of this might be remedied. He did not think the circumstances of the London Companies were at all comparable with any of the water supplies in the country; and he dilated on the utter impracticability of applying a universal uniformity of water rates, charges, and regulations. While at one with the author that the large and wealthy corporations should not be allowed to monopolize the gathering-grounds of the country, he thought, if sufficient provision was made for the needs of the district in the way of compensation water and compulsory supply, the objections would to a large extent be met. What the municipalities had really done in most cases was simply to provide storage for water which previously ran to waste; and in nearly every case of large gravitation works, the dry weather flow of the streams had been improved by the compensation water compulsorily sent down. In preference to central control by a Government Department, he would rely upon the local action of the County Councils, to whom he would give increased powers, in many respects similar to those the author proposed for the Water Board.

Mr. E. Crowne (Urban District Councils Association, and Clerk of the Tottenham District Council) said the district he represented was in the County of Middlesex; and he believed that the County Council were taking up the question in much the same way as the Surrey County Council. His Council were adverse to water being abstracted from a district without the persons residing in the district having first charge upon it. They would give their adherence to the general view of having some authority to better look after the interests of local bodies in certain areas than existed at present.

Mr. E. D. Cecil (Institute of Sanitary Engineers) said that what they wanted was some authority who would give especial attention to the water supply of country districts where the people were too poor to undertake the establishment and maintenance of water-works of their own. Although empowered by the Council of the Institute he represented to speak in favour of a central national control of the water supply of the country, he was sure he should be expressing their opinion in saying they did not countenance interference with existing rights and works, but rather that additional facilities should be provided for the supply of such places as were sorely in need of it.

Mr. R. St. George Moore, M.Inst.C.E., thought those who were advocating the new tribunal could hardly have had large experience of the very detailed way in which the Committees of the Houses of Parliament went into these questions, and what a tremendous advantage every person who was interfered with by any new proposals had of stating his case. One suggestion which had occurred to him was that the poorer districts who were not in a position to employ counsel and experts should have some person—some official expert—to whom they could apply to take up their case. He thought it would be a long time before they would get a body of experts who would absolutely agree; and, in his judgment, the present method of Parliamentary Committees was infinitely better than the proposed Board.

Mr. P. F. Kendall (Yorkshire College, Leeds) considered the small communities were so helpless, that they had been the prey to a large extent of the larger communities, simply from lack of organization and knowledge; and it was surely the duty of the Legislature to protect the ignorant. Some of the speakers thought that Parliamentary Committees already admirably performed the functions of the proposed central body. In a rough, general way they did; but, descending to details, it was found they did not. Cases of extreme hardship arose under present conditions; and what confidence could they have in a tribunal

consisting of two Chambers, one of which frequently gave decisions diametrically opposed to the other? At the same time, he had rather grave doubts as to the constitution of the proposed central body; but he had not yet formed any definite opinion about it. They had a central authority already in the Local Government Board, which might be strengthened by the addition of experts, who should not have any other functions than the dealing with water-supply questions; and if they acted in an advisory capacity, what was now desired might be obtained. They also required to have strong local bodies to deal with the water areas.

Mr. J. Patten Barber (Association of Municipal and County Engineers) said it seemed to him that the present safeguards of local authorities were hardly sufficient, especially when they came to consider the case of small towns, particularly with regard to their underground water supplies. He also spoke of the want of accord in the decisions of Parliamentary Committees; and agreed as to the necessity for the establishment of some authority who would take into consideration all the interests that were likely to be affected by a water scheme, so that justice might be done.

Mr. E. J. Silcock (Society of Engineers) remarked that the proposition submitted in the paper was that a Central Water Board would be a cure for all the evils to which it was admitted the present system was liable. He had a great dread of creating another State Department. Those who had had experience of the Local Government Board knew that there was so much delay and difficulty, that the remedy now suggested seemed to be worse than the disease. The control of water supplies should, in his judgment, be as far as possible in the hands of the persons in the immediate locality who were interested in the supply. He did not think a State Department could have efficient control over such a large number of districts as it would be necessary they should have; nor would they be able to exercise proper supervision. He criticized several of the arguments adduced by the author in support of his proposition, and said he agreed with the view of more than one speaker that the Houses of Parliament were very competent judges of how watersheds should be allocated. It seemed to him that what was wanted was not a new governing body, but new laws. The question, for instance, of underground water was in a peculiar position; but if the law was altered, Parliamentary Committees would carry it out. The law as to the pollution of water also required revision.

Mr. H. Ashton Hill (South Staffordshire Water-Works Company) said the subject before them had proved to be a somewhat hazy one; and he had certainly not a very clear idea of what was actually wanted. He thought the report of the Royal Commission on the London Water Supply was deserving of very serious attention, as it seemed to him to have cleared a good deal of the ground; and if they watched the development of the Commission's proposals, it would lead in great measure to the elucidation of the subject. If a Water Board succeeded in London, it would only be a step further to apply the same principles to provincial water supplies. The subject was a very wide one; and there was a great deal of detail which wanted to be worked out before they could arrive at a proper conclusion as to whether what was wanted was a Central Board or District Boards, or whether the two existing Departments—the Local Government Board and the Board of Trade—should be strengthened. If the officers of these bodies were more particularly qualified—that was to say, if, instead of appointing officers of the Royal Engineers as advisers, properly qualified water engineers were selected—this might advance matters. Altogether he did not know that any greater advantages would be derived from a Central Board than was now obtained from Parliament.

Mr. J. Shaw (Boston, Lincs.) thought the principal keynote was in Mr. Jones's statement that "the reconcilement of conflicting vested interests is surely not impossible." He (Mr. Shaw) thought vested, or selfish, interests lay at the bottom of the whole question; and to say that it was not impossible to reconcile selfish interests was a very strong statement indeed. He enlarged upon the point; and then, referring to the allocation of districts to Water Boards, said that, if this Utopian idea came into force, probably the whole of a district would be rated alike for water, while, as they all knew, it cost more to supply some portions of a district than others. In the case of water companies, they had a special charge for high services; while in the case of the local boards, the whole district was charged at one rate, though it cost more to supply the high districts. He thought the conflicting decisions given by Parliamentary Committees might frequently be traced to the nature of, and differences in, the evidence presented to them.

Mr. E. Sandeman (Plymouth) thought that, before going into this subject, they required more information, which should be tabulated and thoroughly digested. Mr. Jones's paper, while very valuable, might have pointed out a few more reasons why there should be a Board of the kind suggested.

Mr. C. H. W. Biggs (London) believed the discussion might be continued to this time next year, and they would be as far off coming to a decision upon the subject as they were then. There were certain facts upon which they were all agreed; and when these facts were put into concrete form, then they would see the next step. Before they could take the next step, they must know exactly where they stood. He advised the collection and tabulation of statistics referring, for example, to the water supply of the whole country, both utilized and unutilized.

Mr. Stephen H. Terry, M.Inst.C.E., formerly one of the Engineering Inspectors of the Local Government Board, ventured to think that the formation of a Central Water Board conducted on the lines of some other Government Departments would very seriously cripple what he might call the water industry of this country. In the House of Commons, they had men of ability, both technical and non-technical, who judged the questions put before them from a disinterested standpoint; and a better arbitrament for such questions as water supply could not, to his mind, be conceived. He thought, however, that some of the existing laws might be dealt with.

Mr. W. A. Richardson (Birkenhead), observing that there was no governing body to take into consideration the preservation of the water that fell upon the country, and to see that a particular water was fit for use, said the whole discussion pointed to the fact that something was wanted. It might be an alteration of the law; but who, he asked, was there to put the law into force, or to bring about an amendment?

Mr. W. G. Peirce (Richmond) was called upon, but stated that, Richmond being in the County of Surrey, Alderman Halsey had covered the whole of the question. He might, however, say with regard to Richmond that, even if Mr. Jones's suggestions came to pass, they would be in an awkward position, as they were surrounded by the London Water Companies, and were limited to their own area for getting a water supply.

Mr. W. H. Holttum, Assoc.M.Inst.C.E., thought there was a good deal of the dog-in-the-manger business about watersheds. He wondered how it would work if a water authority were allowed to establish themselves in a watershed for a term of years—say 100—at the end of which time an inquiry might be held as to the demands that had meanwhile arisen within the watershed area. Mere villages during that time might have become towns, and might have some claim to their own watershed. But small villages as such should not be in a position to shut out a large town who were in immediate want of water.

Mr. Jones, in reply, said he was glad to notice that the Royal Commission on the London Water Supply supported in many points the general principle he had laid down. The question of the "nation's" water supply appeared to him to have been insufficiently considered in the discussion. He did not go into the detail of every little paltry village and town; but he looked upon the water supply as belonging to the nation. The supply should be taken out of the hands of those who were incompetent to utilize it and make the best of it, and be placed under some better system of control. The rainfall was the nation's real source of water supply; and they found that very little of it was utilized. The rainfall of this country varied from some 13 inches in the East to above 220 inches in the North in a year. The Water Board that he suggested would understand these things, and would determine according to the physical configuration of the country, its aspects, and so forth, what was the mean rainfall over a particular area or water basin. Before any authority should have power to extend their works, or carry out structural alterations, they should give to the Board a strict account of how far they were utilizing the water they already had. It had been objected that another Board should not be established to revise what had already been done by two Government Departments. That seemed rather anomalous; but it should be remembered that, even in the Law Courts, one set of Judges was kept to revise the decisions of those below them. Therefore, there was really no reason why they should not have a Central Board to revise the decisions of the other authorities. He admitted that local authorities had done good work; but it had been done from their point of view. If returns could be obtained (which could not be done except by the aid of Parliament)—full and accurate returns of the water gathered, the water which might be gathered, but was not gathered, the quantity sent out, and the waste—some important information would be available. They had annual returns for gas and chemical undertakings, why not for water undertakings? As to Parliament being the proper tribunal for deciding questions of water supply, he was afraid that members of Parliament knew very little of the intricacies of the subject. He commented on the action of the House of Lords in throwing out (after it had been passed by the House of Commons) a Bill of the East London Water Company, by which it was proposed to construct additional reservoirs in the Lea Valley; and yet, coming to the meeting that day, he saw thousands of acres of land in that district flooded with water which might have been stored. A water famine in this country was a disgrace. In his paper, he did not propose to interfere with vested interests where they could be proved to be to the public welfare, nor did he propose to take away anyone's rights, or cancel any agreement. In the course of further remarks, he said he admitted that further information was wanted, and also that the law was at fault. He acknowledged the excellent reception accorded to the paper.

The Southern District Association of Gas Engineers and Managers will hold their annual meeting next Thursday, at the Holborn Restaurant. According to the circular issued by the Hon. Secretary (Mr. J. W. Helps, of Croydon), the business will, as usual, consist chiefly of the reception of the report of the Committee on the work of the past year, and the delivery by the President—Mr. D. Irving, of Bristol—of his Inaugural Address. The annual dinner will take place the same evening.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Damage to Mains from Electrolysis.

SIR,—With reference to the remarks in your issue of the 20th inst., in the article headed "Water and Sanitary Affairs," as to damage to mains from electrolysis, I am desired to state that it is a matter to which this Association consider they should give their attention; and I am instructed to request you to be good enough to allow me, through your columns, to invite Gas Companies who have sustained damage by reason of electrolytic action on their mains and pipes to give me any information they can with reference thereto, with the view of endeavouring to get the present "model" clause for the protection of Gas and Water Companies revised.

F. E. COOPER, Secretary,
Gas Companies' Protection Association.

5, Victoria Street, S.W., Feb. 26, 1900.

The Price of Gas for Power Purposes at Widnes.

SIR,—In your issue of the 20th inst., you refer to the above matter, and state that the price of gas for motive power is to be reduced from 1s. 5d. to 1s. 3d. per 1000 cubic feet, less 2d. per 1000 feet discount. Will you kindly permit me to supplement this by stating that the prices of gas at Widnes, prior to the recent reduction, were 1s. 5d. and 1s. 3d. per 1000 cubic feet net for all purposes, and that the price now is 1s. 1d. net to all consumers of gas for motive power, which means a reduction of 4d. to the small consumers paying 1s. 5d., and 2d. to the large ones paying 1s. 3d.

ISAAC CARR.

Widnes, Feb. 23, 1900.

A Remedy for Stopped Ascension-Pipes.

SIR,—In perusing the "JOURNAL," I find that the gas men of England are annoyed with the trouble which formerly caused us so much difficulty—viz., stopped stand-pipes and pitch in the hydraulic main. Eighteen months ago our foreman, Mr. D. Galligher, devised a remedy for this, and we have never since had a stopped pipe or any trouble with pitch, although our yield of gas from Pittsburg coal last year averaged 4·96 cubic feet per pound of coal. His method is to tap the stand-pipe near the top with 1-inch pipe, place thereon a syphon through which a stream of water is run into the stand-pipe, tap the latter again immediately above the mouthpiece, and insert therein a thermometer, and allow sufficient water to run through the stand-pipe to keep the temperature of the gas as it goes up at between 400° and 450° Fahr. Tar does not form pitch at less than a temperature of 550°; and we find that with the temperature above noted all the tar goes through the stand-pipe and into the hydraulic main thin enough to be handled easily. Previously to adopting this plan, we fully expected a stand-pipe to clog up at least once out of every six charges, and our hydraulic main to entirely close with pitch at least once a week; but, as stated, this simple appliance has proved a complete remedy.

S. M. HIGHLANDS, President.

Clinton (Iowa) Gas Company, Jan. 29, 1900.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress was made with Private Bills last week:—

Bills read a second time: Cleethorpes Gas Bill, Exmouth and District Water Bill, Exmouth Urban District Water Bill, Fishguard Water and Gas Bill, Glyncorrwg Urban District Council Gas Bill, Great Berkhamsted Water Bill, Kingston-upon-Thames Gas Bill, Newport (Mon.) Gas Bill, Walsall Corporation Bill, Westgate and Birchington Water Bill.

Petitions were presented against the following Bills: Dorking Water Bill, East Shropshire Water Bill, East Stirlingshire Water Bill, Exmouth and District Water Bill, Falkirk and District Water Bill, Falkirk Corporation Bill, Fishguard Water and Gas Bill, Glyncorrwg Urban District Council Gas Bill, Great Berkhamsted Water Bill, Hemel Hempstead Corporation (Water) Bill, Higham Ferrers Water Bill, Kingston-upon-Thames Gas Bill, Margate Corporation Bill, Menstone Water (Transfer) Bill, Motherwell Water Bill, Mountain Ash Water Bill, Newtown and Llanllwchaiarn Urban District Gas Bill, Paignton Urban District Water Bill, Rotherham Corporation Bill, Salford Corporation Bill, South Essex Water Bill, South Essex Water Board Bill, Walsall Corporation Bill, Westgate and Birchington Water Bill.

HOUSE OF COMMONS.

The following further progress was made with Private Bills last week:—

Bills read a second time and committed: Airdrie, Coatbridge, and District Water Trust Bill, Bedford Gas Bill, Bradford Corporation Bill, Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill, Glastonbury Corporation Gas Bill, Grantham Gas Bill, Hartlepool Gas and Water Bill, Morecambe Urban District Council (Gas) Bill, North Warwickshire Water Bill, Oldham Corporation Bill, Ossett Corporation Gas Bill, Redhill Gas Bill, Rugeley Gas Bill, St. Albans Water Bill, Southport Water Bill, Spalding Urban District Council (Water) Bill, Wetherby District Water Bill, Woodbridge District Water Bill.

Bill withdrawn: Chelsea Water Bill.

Petitions were presented against the following Bills: Airdrie, Coatbridge, and District Water Trust Bill, Bedford Gas Bill, Bradford Corporation Bill, British Gaslight Company (Staffordshire Potteries) Bill, East London Water Bill, Gaslight and Coke Company Bill, Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill, Glastonbury and Street Gas Bill, Glastonbury Corporation Gas Bill, Hartlepool Gas and Water Bill, Lambeth Water Bill, London Water (Purchase) Bill, London Water (Welsh Supply) Bill, Metropolitan Water Companies Bill, Mid-Kent Water Bill, Morecambe Urban District Council (Gas) Bill, North Warwickshire Water Bill, Oldham Corporation Bill, Ossett Corporation Gas Bill, Ossett Gas Bill, Redhill Gas Bill, Rickmansworth and Uxbridge Valley Water Bill, St. Albans Water Bill, South Metropolitan Gas Bill, Southport Water Bill, Wandsworth and Putney Gas Bill, Wetherby District Water Bill, Wolverhampton Gas Bill, Woodbridge District Water Bill.

Petitions against the Gaslight and Coke, Commercial Gas, and South Metropolitan Gas Companies Bill of the London County Council have been presented by the three Companies concerned as well as by the Corporation of London.

Mr. Lough has given notice to move the rejection of the South Metropolitan Gas Bill and the Wandsworth and Putney Gas Bill when they come up for second reading.

Last Tuesday, Sir C. Quilter asked the First Lord of the Treasury if he could explain to the House the circumstances which had influenced the Lords of the Treasury to authorize Her Majesty's Board of Customs to allow, upon certain conditions, the exportation of carbolic acid and other similar articles, the exportation of which was recently strictly prohibited by Royal Proclamation; whether the bulk of these articles was exported in a crude state, and was refined on the Continent (frequently being mixed with other raw material produced there), so as to make it impossible to trace the ultimate destination of any particular consignment after it had been refined or converted; and whether, as the object of the proclamation was to prevent articles which were capable of being converted into lyddite, melinite, and other high explosives, and for the supply of which Continental and other nations mainly relied upon this country, from reaching the Queen's enemies, he would rigidly enforce the original terms of the proclamation. Mr. Balfour, in reply, said he was informed that very careful inquiry had been made into the export trade in carbolic acid and other similar articles. It was proved to the satisfaction of the Government that there was a large and legitimate trade in these articles in foreign countries and in the colonies, with which it was clearly inexpedient to interfere. But the destination of these consignments could be traced very accurately—indeed, a large proportion of the exported material came back to this country. He added that the honourable member might rest assured the instructions which had been given would not in any way defeat the object of the proclamation.

On Friday, Mr. Cornwallis asked the President of the Local Government Board if he intended to introduce a Bill this session to safeguard to consumers the supply of drinking water by companies and others. Mr. Chaplin replied that he had a Bill in preparation with this object; and he had every hope of introducing it.

LEGAL INTELLIGENCE.

HOUSE OF LORDS.

Feb. 19, 20, and 22.

(*Before the* LORD CHANCELLOR *and Lords* MACNAGHTEN, MORRIS, SHAND, JAMES, *and* BRAMPTON.)

Sutton, Southcoates, and Drypool Gas Company v. Jordeson.

This was an appeal from a judgment of the Court of Appeal in an action in which the respondent was the plaintiff and the appellants (together with a firm of Contractors trading under the style of Messrs. Holme and King) were the defendants, whereby a majority of the Court affirmed the judgment of Mr. Justice North, sitting in the Chancery Division of the High Court of Justice, by which an injunction was granted restraining the defendants from darkening ancient lights in buildings belonging to the plaintiff; the defendants being ordered to pay to him £340 in respect of damage caused by the subsidence of certain buildings by reason of the construction of works carried out by them, and his costs of the action.* The appellants contended: (1) That, assuming that the respondent's lights would be darkened, and that the appellants had damaged his buildings, no action lay against them having regard to their parliamentary powers. (2) That, as regarded the lights, assuming an action would lie, no injunction ought to be granted, and that damages only ought to be awarded. (3) That, as regarded the damage caused by subsidence, no action would lie because such subsidence was occasioned by pumping water out of the appellants' own land, and thereby draining water from under the respondent's land, which the appellants said gave no right of action. The respondent was the owner of some land near Hull, and on the land there were houses, the windows in some of which had existed more than 30 years before the commencement of the action. The appellants' works were within a short distance of the respondent's houses. The appellants had power to buy land by agreement, but not compulsorily. Their statutes incorporated the Lands Clauses Consolidation Act (except the provisions relating to compulsory purchase), and also the Gas-Works Clauses Acts, 1847 and 1871. In the district in which the plaintiff's land and the defendants' works were situate, there was a large stratum of what was called running silt, well known to persons acquainted with the geological structure of the earth at Hull, and a constant source of trouble to all who had to make deep excavations into it. This stratum of silt extended for some miles both in length and breadth. It was some 6 feet thick, and was about 22 feet below the surface where the appellants' works and the respondent's houses were. The land on which the respondent's houses stood, was, in fact, supported by this stratum of silt, and by the earth above and below it. Before 1877, the appellants' works were comparatively small; their gasholders were of no great height; and their works in no way injured the respondent. But in 1877, they resolved to enlarge their works, and to construct a very much larger gasholder than they had before. Its diameter was to be 152 feet, and its height 105 feet. The appellants began to excavate their land in order to receive this gasholder.

* See "JOURNAL," Vol. LXXI., pp. 284, 348, 409; Vol. LXII., p. 319; Vol. LXXIII., pp. 807, 992, 1381, 1766.

They got down to, and cut through, the stratum of silt. They took all precautions to keep the silt as they cut through it; but, notwithstanding all their care, the land under the respondent's houses subsided, causing damage to the buildings. The appellants contended that, whatever their liability apart from their Special Acts, they were protected by them against such actions as the present for obstruction of light, and they based this contention on *The London and Brighton Railway Company v. Truman*. In regard to the question of subsidence, the appellants attempted to justify their conduct by their special statutory powers. Even if they failed in this, they said they were not liable at common law for the damage by subsidence, first because they only pumped water from their own land, and, secondly, because, although sand came with the water so pumped, the stratum of running silt under the respondent's land only shrunk by reason of the abstraction of water from it, and that no soil, in any appreciable quantity at all events, was removed from under the respondent's buildings. They said, in short, that the subsidence was caused by the withdrawal of underground water from the respondent's land by lawful pumping on their own land; and that, although damage ensued, no nuisance or other actionable wrong was committed by them. For this they relied on *Popplewell v. Hodgkinson* (1869, 4 Exch.).

Mr. HALDANE, Q.C., who opened the case for the appellants, said the question to be determined really arose out of the peculiar formation of the soil under Hull, which consisted of running silt—a black sand of fine consistency containing 12½ per cent. of water. The result was, in digging for a foundation, a person drained not only his own, but the adjoining land. In the present case, it was not disputed that the operations in connection with the construction of the gasholder did produce subsidence in the adjoining land, and that some damage was caused; but the appellants were acting under statutory powers. They had not acted negligently; and what had happened was the natural consequence of the drainage of the soil resulting from the excavation. One important question for decision was: Had the appellants drained away dead water with silt in it, or had they taken away a substantial portion of their neighbours' soil. On this, it might be necessary to consider whether the judgment in *Popplewell v. Hodgkinson* was correct, where it was held that pumping underground water from one's own land, even if it let down a neighbour's houses, would not give cause of action. He conceded that the damage done was the natural outcome of the operations of the appellants, acting under statutory authority.

The LORD CHANCELLOR: Was there any doubt of the fact that, rightly or wrongly, the execution of these works has damaged the neighbouring property?

Mr. HALDANE said he did not dispute that damage had been done to the extent of £340.

Lord MORRIS: Had the houses been long erected?

Mr. HALDANE replied since 1836; but he was not raising, as regarded this part of the case, any question such as was raised in *Dalton v. Angus*. It was entirely with regard to the third lift of the gasholder that the question of interfering with the light arose. The gasholder was made in three lifts; and, when inflated, it rose to the height of 105 feet. As a matter of fact, only two lifts were used, which took it to a height of 68 feet. The injunction granted did not preclude its being raised to this height, as it was said that did not interfere with the light. But the prohibition to raise the holder to its full height was a matter of considerable moment to the Company, because they were afraid they would not be able to give the requisite supply unless it could be utilized to its full capacity. In order to make the holder, it was necessary to dig a tank into which it could be sunk. The trench formed a round ring, and it was 37 feet deep. He thought he had stated enough to show their Lordships how the question arose. The appellants said, in digging the trench, they put down timber so as to keep back everything except the water. Besides this, there was a quantity of the soil in the appellants' own ground which became dry, and thus formed a barrier to prevent the most distant silt coming into the trench.

The LORD CHANCELLOR: What have you done?

Mr. HALDANE: There has been a substantial removal of silt.

The LORD CHANCELLOR: And the taking away of that substantial amount has caused the damage?

Mr. HALDANE thought it was quite possible that what caused the damage was the drying of the silt by the abstraction of the water during the progress of the works.

The LORD CHANCELLOR: What sort of inquiry are we entering upon? There are two propositions. Are we going to try these questions?

Mr. HALDANE said he believed the Court of Appeal had not sufficiently addressed their minds to what was the cause of the damage.

The LORD CHANCELLOR: But damage was done by the removal of the silt.

Mr. HALDANE admitted that damage did take place.

The LORD CHANCELLOR: You say you have a right to take away the water, but you have no right to take away the earth which forms part of the support of your neighbour's house?

Mr. HALDANE: No.

The LORD CHANCELLOR said that, if he remembered right, what was decided in *Popplewell v. Hodgkinson* was that, assuming the support was afforded by water, you have no right to the subterranean water.

Mr. HALDANE: The Judge said that what we had taken out was water, *plus* silt.

The LORD CHANCELLOR: In other words, that you had removed such an important part of the adjacent soil as to affect the house.

Mr. HALDANE said even if the appellants had done that, which he did not admit, they had done it under statutory powers; so that it was a lawful act. Further, the proper remedy of the respondent was not an injunction, but compensation under section 68 of the Lands Clauses Act. There was doubt about this point in the Court below, because it was said a clause such as was in the Private Act of the appellants excluded section 68; but he contended that this was not the case.

Lord SHAND said the appellants might be right in saying that what was taken out of the trench was their own silt, but they had no right to take out so much as to affect adjacent property. Did the respondent complain that silt was taken from his ground?

Mr. HALDANE said there was no allegation that any silt was taken from the adjacent land, except such as oozed through. Of course, the appellants pumped water inside their coffer dam, and they pumped out silt which was in suspension.

The LORD CHANCELLOR: You mean that the silt came from your own ground.

Lord SHAND: I understand the respondents do not contend that you took their silt.

Mr. UPJOHN: Yes; we do.

Lord MORRIS said he had never seen a coffer dam put up in order to obtain a foundation.

Mr. HALDANE: Then, my Lord, you have never been to Hull.

Lord MORRIS: If you have a right to build a gasholder, surely you do not require a coffer dam to enable you to make your excavations.

Mr. HALDANE: The explanation is the nature of the soil at Hull.

Lord MORRIS: But it is for your own purpose that you make this coffer dam, because otherwise you would not have time to build your wall before it was swamped by the silt.

The LORD CHANCELLOR: You could not build unless you build in the dry. You could not build in the dry without a coffer dam.

Lord MORRIS: But that is for your own purpose.

The LORD CHANCELLOR: I do not care about that.

When the House met again on Thursday, during the course of Mr. Haldane's argument,

The LORD CHANCELLOR threw out a suggestion that, as there had been no findings by a Jury in this case, and there were several disputed points, the parties might be well advised to try and come to some settlement in the matter.

There being no evident willingness on the part of the litigants to adopt the suggestion, the learned Counsel again proceeded with his argument; but before the adjournment for lunch the matter was again referred to.

The LORD CHANCELLOR, addressing Mr. Haldane, said: May I again ask you to consider what has been said as to an arrangement. The question of law may be clear; but it looks to me to be absolutely impossible to say which of the three hypotheses which have been put forward as regulating the question of law is to be adopted as a question of fact. You have not dealt with the question of light. I see that Clyde Terrace comes within 6 or 7 feet of your gasholder, which is 105 feet high when inflated.

Mr. HALDANE said the houses the light to which was said to be interfered with, were not so near as 6 or 7 feet.

Lord JAMES: But all the Judges were against you on the question of light.

Mr. HALDANE admitted that was the case.

The LORD CHANCELLOR: All I say is if the injunction remains, what is to become of this gasholder. On the other hand, Mr. Upjohn, for the respondent, would be well advised to consider whether these interesting questions of law might not be decided adversely to him in some respects, and then there would be a new trial.

On returning from luncheon,

The LORD CHANCELLOR asked if any understanding had been arrived at, and if the parties thought Lord James could assist them in coming to terms if they saw him in his private room? He might conciliate them, and give some wholesome advice on which they could come to terms.

Mr. UPJOHN, for the respondent, said he was perfectly willing.

Mr. HALDANE: And so am I, so far as that goes.

Lord JAMES: If I can be of any use to you, I will do my best.

Mr. HALDANE: My difficulty is this—that my clients have made a most liberal offer.

Mr. UPJOHN: Confiscation, I call it.

Mr. HALDANE: And they have gone to the extreme limits to which they can go.

The LORD CHANCELLOR: Then I shall not ask my noble friend to undergo the pleasure of listening to you, if you have made up your minds already.

Lord JAMES: If you tell me that, I shall certainly forego the pleasure of meeting you.

Mr. HALDANE: We have gone far beyond any terms we ever intended making.

Lord MORRIS: If you are confident you have been so generous, you ought not to object to meet Lord James.

Mr. HALDANE: If his Lordship will be so good as see us, I will try and get authority to determine the matter.

The LORD CHANCELLOR: I think before we ask Lord James to take the trouble to listen to this controversy, it must be understood that the parties agree to do what he suggests as reasonable.

Mr. HALDANE: There are difficulties, as the respondent says he must get all his costs here and in the Court below. We cannot consent to that, as we have offered a substantial sum.

The LORD CHANCELLOR: I do not want to hear the terms. The question is, if Lord James is good enough to give his assistance in trying to come to an arrangement with you, will you agree to do what he suggests as reasonable?

Mr. HALDANE: I must get authority before I answer that question.

After a brief consultation with his clients,

Mr. HALDANE said his clients would leave the matter unconditionally in Lord James's hands.

Mr. UPJOHN: I agree.

The LORD CHANCELLOR: In that case, we will do no more to-day. If anything is to be said in the way of judgment, after what my noble friend determines between you, that can be said to-morrow.

Mr. UPJOHN: I do not think that will be necessary, as we will leave it in the hands of Lord James.

Their Lordships then adjourned, and the parties retired to the room of Lord James, to lay the matter before him as a sort of Arbitrator.

When their Lordships (except Lord Shand) met on Friday,

Lord JAMES handed in the terms which had been agreed upon between him and the Counsel for the parties. No mention was made as to the nature of the agreement arrived at; but his Lordship, addressing Counsel, said they would see that it was carried out in proper form.

Mr. UPJOHN, for the respondent, said the formal agreement would be sent to his Lordship to be initialled.

The LORD CHANCELLOR: If it is thought desirable that there should be any formal order made hereafter that you have settled the matter between yourselves, we can do it. In the meantime, you will do what you think necessary to carry out the terms.

The parties then retired.

HIGH COURT OF JUSTICE (IRELAND)—CHANCERY DIVISION.

Tuesday, Feb. 20.

(*Before the* MASTER OF THE ROLLS.)

Alliance and Dublin Consumers' Gas Company v. Thompson and Harris—Traction-Engines and Damages to Gas-Pipes.

To-day an application was made on behalf of the plaintiffs for an interlocutory injunction to restrain the defendants, who are haulage contractors at Ringsend, Dublin, from "using, or causing to be used, any steam or other traction engine in such a way as to fracture, damage, or injure the mains and pipes of the plaintiffs, until the trial of the action."

Mr. S. RONAN, Q.C., Mr. J. GORDON, Q.C., and Mr. PIM appeared for the plaintiffs; Mr. J. WAKELY, Q.C., and Mr. CHAMBERS represented the defendants.

Mr. RONAN stated, in support of the application, that the defendants had a very heavy traction-engine, and had been using it in portions of Dublin, near Ringsend. They had repeatedly broken the mains of the plaintiffs; and the results had been simply disastrous. When the pipes had been broken, the gas escaped into the soil, and made its way into the houses. He believed the death of one person had occurred in consequence; and it had been the cause of serious illness to others. Mr. W. F. Cotton, the Managing Director of the Company, had made an affidavit, in which he stated that the Company had laid down mains in certain specified streets, and that for some time past the defendants had, for the purpose of their business, used a traction-engine of enormous weight thereon. Mr. Cotton referred to letters which the plaintiffs had, on the 22nd of July last, written to the defendants calling attention to the injuries done to the gas-mains by their traction-engine, requiring them to desist using it, and informing them that the firm would be held responsible. On the 24th of January, the plaintiffs complained of more breakages. On the 5th and 6th inst., the Company wrote further letters in regard to injuries caused to mains and pipes by the weight of the engine. The defendants, however, had not discontinued the use of it; and it was feared that if they were not restrained some serious accident might occur to life or property. Mr. Cotton had been chief officer of the Company from 1873, since which year there had been no instance of injury caused to the mains or services by the ordinary traffic on the streets. Mr. Waterfield, their Distributing Engineer, had also made an affidavit in which he gave particulars of a number of breakages which had occurred between Jan. 20 and Feb. 8. From the appearance of the ground, the fractures had been caused by a traction-engine. The weight of the defendants' engine was from 10 to 12 tons, and the trucks—of which there were sometimes as many as four—weighed about 1½ tons each. Mr. Charles Thompson, one of the defendants, had made an affidavit that traction-engines and waggons similar to those recently used in the neighbourhood of Ringsend had been employed by him in all parts of the city and suburbs for the past nine years, and no claim for injury had ever been made, except about five years ago, when a gas-pipe was alleged to have been broken by an engine at Milltown; but on an investigation of this claim, it was at once withdrawn by the Gas Company. The engine and waggons were within the statutory requirements, and no allegation of negligence as to the mode of using them had been made against the defendants or their servants, who were well trained, and skilled and competent workmen. He was not in a position to admit or deny that the injuries referred to were caused by the engine; but he was willing to pay for the restoration and repair of all damage which might be proved, having regard to the mode in which the mains and pipes had been laid and the condition of the roads. The soil of the roads in which the pipes were laid was very soft, having been reclaimed from the sea, and was of a very sandy nature; and the roads were insufficiently macadamized. They were public streets, open for traffic of all kinds, but they had not been used for heavy traffic until recently. He measured the depth of the gas-pipes below the surface of one road, where an injury was alleged to have been caused by the engine, and found that it was only 18 inches. Having regard to the nature of the road, and to the quantity of metalled surface upon it, he did not think these pipes were laid at sufficient depth in the ground to be protected from the consequences of traffic other than that of a light cart or a small waggon. Counsel read affidavits from parties who deposed to illness occurring in their families as the result of the escape of gas, and submitted that the case was a clear one for an injunction.

Mr. WAKELY resisted the application. He said, first, that, assuming the traction-engine caused the damage complained of, without any default on the part of the Gas Company in the laying of their mains and pipes, as the defendants had statutory authority for taking their engines along the streets an injunction would not lie; the remedy would be by an action for damages. Secondly, it was quite clear upon the facts that a very serious question as to who was in fault arose in this action, and it could only be determined at the hearing. The defendants would satisfy the Court that they were not to blame for the damage, but the Company, for the way in which they had laid their mains and pipes in the particular streets where the accidents had occurred. If this interlocutory injunction were granted, it would prevent the defendants from carrying on their business.

The MASTER OF THE ROLLS: They can carry on their business as they like, so that they do not cause damage with their traction-engine.

Mr. WAKELY said it lay on the Company, in a district like the one in question, which had been reclaimed from the sea, to be particularly careful as to the depth at which they laid their pipes, so that they would be sufficiently protected, and they had not been so here.

Mr. CHAMBERS and Mr. GORDON having addressed the Court,

The MASTER OF THE ROLLS, in granting the injunction, said he did not decide anything finally in the case, but acted on the clear balance of evidence of proof in reference to matters now in dispute. The complaint was not that the traction-engine had been used in a negligent way, but that the consequence of using it in a certain place was that the plaintiffs' pipes were broken; and they said the defendants had no right to do this, whether they were skilful or not. Without expressing a conclusive opinion, he was bound to say that at present there was an overwhelming case that the plaintiffs' pipes were not improperly laid. If the engine had been going over them for the last nine years, and no injury had been done, this would appear to be strong testimony in favour of the proper laying; if, on the other hand, the engine had not been going over them, then they were sufficient to bear the ordinary traffic until the engine came. This was the dilemma in the case. As a matter of absolute fact, he took it that these pipes had stood the ordinary traffic, and that they were adequate to do so. As regarded negligence on the part of the plaintiffs, there was not a scintilla of evidence of it, in his opinion. The injunction would therefore be, on the plaintiffs undertaking to abide by any order as to damages, "to restrain defendants, their servants, and workmen, from using, or causing to be used, any steam or other traction-engine in such a way as to fracture the gas mains or pipes of the plaintiff Company, until further order."

The Morley Corporation and their Catchwater.

In the House of Lords last Tuesday, the Lord Chancellor and Lords Macnaghten, Morris, Shand, James of Hereford, and Brampton had before them the case of *Fielden v. Mayor and Corporation of Morley*. The action was originally brought to restrain the defendants from allowing water to overflow on to the appellant's land from a catchwater constructed by the Corporation under their Act of 1890. The appellant also asked for damages. The substantial question was whether the Corporation had, in constructing the catchwater and certain works connected therewith, exceeded their statutory powers under the Act mentioned. The action was first tried by Mr. Justice Byrne in April, 1898; and he dismissed it, and ordered the plaintiff to pay the defendants' costs—expressing the opinion that the acts complained of were justified by the Corporation's statutory powers, and that the appellant's remedy, if any, was by way of compensation under the General Acts, and not by way of action. Later in the year, the plaintiff appealed against this judgment; but it was affirmed by the Master of the Rolls and Lords Justices Chitty and Collins. The former proceedings were reported in the "JOURNAL," Vol. LXXI., p. 1015; and the latter in Vol. LXXII., p. 319. The matter was then taken to the House of Lords. Mr. Moulton, Q.C., Mr. Cripps, Q.C., and Mr. Leigh Clare appeared for the appellant; Mr. Eve, Q.C., and Mr. R. J. Parker represented the respondents. At the conclusion of the arguments for the appellant, the Lord Chancellor, without calling upon the respondents' Counsel, gave his reasons at some length for agreeing with Mr. Justice Byrne and the Court of Appeal; and, in moving that the appeal be dismissed, said he had never known "a more trumpery and frivolous action." The other learned Lords concurring, the appeal was dismissed.

The Incandescent Gas-Light Litigation.

In the Chancery Division of the High Court of Justice last Friday, before Mr. Justice Byrne, Mr. T. Terrell, Q.C. (Mr. Walter with him), moved for an injunction to restrain the New Sunlight Incandescent Company, Limited, from selling mantles infringing the 1896 patent of the Incandescent Gas-Light Company, Limited. The defendants were represented by Mr. Bousfield, Q.C., and Mr. Graham. Mr. Terrell said an action had been brought against the defendants' predecessors, and Mr. Justice Buckley had given judgment in favour of the plaintiffs, though he did not grant an injunction, for reasons which would appear when he read the judgment (*ante*, p. 475). He now moved for an injunction against the present Company and their Directors for practically the same infringement as that which came in question in the recent action. Having read an affidavit by Mr. Pugh giving the facts generally, he read another by Mr. Ballantyne stating that on the 15th inst. he purchased, at defendants' premises in Shoe Lane, three mantles which he analyzed, and found to be substantially the same as those dealt with in the previous action; the only difference being that the proportion of calcium oxide was slightly less. In his opinion, these mantles were a direct infringement of the plaintiffs' patent. Professor Dewar had made an affidavit in practically the same terms, except as to the purchase. He next read the affidavit of Mr. Selwyn Francis Edge, filed on behalf of the defendants, in which he set out the reasons why Mr. Justice Buckley declined to grant an injunction, and stated that an appeal had already been entered. Mr. Justice Byrne suggested that it would be much more convenient if Mr. Justice Buckley could hear this motion. Counsel having expressed their willingness to such a course being taken, his Lordship went to consult his learned brother on the subject. On his return, he said that Mr. Justice Buckley would hear the motion on Wednesday (to-morrow).

Wath-upon-Dearne Gas and Lighting Company, Limited.

A petition asking the Court to confirm special resolutions for the extension of this Company's area came before Mr. Justice Cozens-Hardy, in the Chancery Division of the High Court of Justice, last Saturday. Mr. Vernon Smith, Q.C., said the Company was formed many years ago to take over the business of a Gas Company who supplied two townships named Wath-upon-Dearne and Bolton-upon-Dearne, in the county of York. It was now proposed to supply gas to the following districts: Brampton Bierlow, Thurnscoe, Hickleton, and Barnborough; and resolutions had been passed altering the Memorandum of Association in this respect. It was also proposed to change the name of the Company to the Wath-upon-Dearne and District Gas Company. His Lordship sanctioned the proposed alteration.

Selling Infringing Incandescent Mantles.

At the last Sandwich Quarter Sessions, David Felix, *alias* W. Hill or Luke, 26, a barber, was charged with unlawfully and knowingly obtaining by false pretences, from James Assiter, the sum of £4 17s. 6d., between the 20th of August and the 10th of November last. The case for the prosecution was that defendant, under the name of Luke, called on Mr. Assiter, a plumber and decorator at Ramsgate, and showed him some specimens of incandescent mantles. On the assurance that they were not infringements of the Welsbach patent, and that they were manufactured

by defendant's Company—the Incandescent Light Company, Fulham—Mr. Assiter purchased a quantity of the goods, and further orders were given at subsequent dates. In course of time, he was visited by the representative of the Welsbach Company; and he then discovered that the mantles were made in Germany, and that they were cheap imitations of the Welsbach patent. This constituted the charge of fraud upon which the proceedings were taken. It was stated that there was no Incandescent Light Company, no W. Hills by whom the receipts were signed, and no Mr. Luke, except defendant himself. From the evidence of the Solicitor of the Welsbach Company, it appeared that proceedings had been taken against defendant, and an injunction obtained against him. The defence was that the prosecutor had not been defrauded of any money. He had derived profit on the sales of the mantles, and owed defendant between £7 and £8. While it was admitted that the mantles were infringements of the Welsbach patent, it was alleged that Assiter was perfectly well aware of this fact when he purchased them. The Jury found defendant guilty; and he was sentenced to nine months' imprisonment, with hard labour.

The Cost of Gas and Electric Light.

At the Westminster County Court last Thursday, his Honour Judge Lumley-Smith, Q.C., and a Jury had before them an action by the National Free Wiring Company, Limited, to recover £19 odd for fittings supplied to the defendant, Henry Austin Lambert, the proprietor of the Jolly Sailors, Lower Road, Rotherhithe. Plaintiffs' case was that the Company were in the habit of wiring premises and supplying electric light fittings. If special fittings were required, they were to be paid for; the others being supplied on a rental of ¾d. per unit of electricity supplied each quarter. There was also a charge of £10 for altering gaseliers to electroliers. The electricity was supplied by the London Electric Supply Corporation, and they collected the rental. Plaintiffs' cashier admitted that they had a man named Collins who was a canvasser, and that he obtained the orders. He was not present. Circulars (one of which was produced) were distributed by the Corporation, stating that after two hours electricity only cost 3d. per unit, which was equal to 1s. 9d. per 1000 cubic feet of gas. Mr. Giveen, defendant's Counsel, said, if the contract was entered into in consequence of the misrepresentation of the plaintiffs' canvasser, he thought the Jury would set it aside. When Collins first called, Mr. Lambert refused to have anything to do with the electric light; but subsequently he told him that it would be very much cheaper than gas. Mr. Lambert said: "Why should I change?" Collins replied that electricity was so much cheaper; and he gave Mr. Lambert the Corporation's circular, which set forth that the cost would be but 3d. per unit after 1½ hours. What was the result? The gas bill for the previous year was £70, and the electricity bill from February to October was £120. After this, he had the fittings removed. Defendant bore out this statement, and said not only was the electric light much more expensive, but it was not so good as gas; and he spent £40 in going back to the older illuminant. He would never have entered into the agreement but for the fact that it was urged that electricity was so much cheaper. Plaintiffs' Solicitor pointed out that the circular of the Corporation stated that the cost per unit was 6d., and several months elapsed between the first call of Collins and the time the contract was entered into. The 3d. related to electricity supplied for motors; and the scale for light did not go beyond 5d. His Honour said he failed to see why the 3d. should be put in the circular. Everyone knew that the electric light was dearer than gas. People grumbled that the gas was not good, and that electric light was dear. He knew of no one who paid less than 6d. a unit. Mr. Giveen wished to call a number of traders to give evidence as to the great increase in the cost of electricity as compared with gas; but his Honour declined to allow him to do so. In addressing the Jury, he told them that if the contract was entered into in consequence of fraudulent statements made by Collins, it could be set aside. It was for them to say whether or not this had been proved to their satisfaction. The Jury found for the plaintiffs for £10, which was apparently for the alteration to the gaseliers.

A Decision Against the Brymbo Water Company for Refusing a Supply.

The Wrexham County Bench on Monday last week gave their decision in an action brought by Mr. E. S. Clark, of Oak Alyn, Gwersyllt, and proprietor of the Llay Hall Colliery, against the Brymbo Water Company for having refused to furnish him with a supply of water for thirty-four days during May and June, 1899, contrary to the provisions of the Water-Works Clauses Act, 1847, and the Company's Special Act, and claiming a penalty of £10, and £2 per day for the whole thirty-four days. The first hearing of the case was on the 5th inst., when Mr. S. Moss, M.P., appeared for the complainant, and Mr. J. H. Pierce for the Company. It was stated by Mr. Moss that the case was the result of a struggle between Mr. Clark and the Company commencing in 1893. The Company insisted that they were entitled to force upon Mr. Clark a domestic supply of water by meter, and not in accordance with the rateable value of the house he occupied. He (Mr. Moss) maintained that this was a high-handed proceeding on the part of the Company, and an illegal attempt at extortion. Counsel read a voluminous correspondence which had passed between the parties, showing that in 1894, although the meter was put in and the water passed through it, Mr. Clark was allowed to pay a rate upon the basis of his assessment. In September, 1896, there was again an attempt to force a water supply by meter upon Mr. Clark, followed by another lengthy correspondence; and in September, 1897, the Company cut off the Oak Alyn supply, as Mr. Clark declined to pay 1s. per 1000 gallons—the amount of the disputed account being £25 18s. In September, 1897, after the Company cut off the water, Mr. Clark coupled up the Oak Alyn pipes with the trade pipes to the colliery, and so obtained a supply for domestic and other purposes at Oak Alyn from that time until May 19, 1899. On behalf of the Company, Mr. Pierce argued that if they deprived Mr. Clark of water it was in 1897, from which time down to 1899 he got his domestic supply from his trade supply. The Company were not bound to supply the complainant with water for trade purposes, except by agreement. After an agreement had been made, the remedy was by civil action. As regards the meter, the Company decided upon installing that instrument owing to the great waste of water which was evidently going on at Mr. Clark's premises. The case was adjourned until yesterday week, when it transpired that the complainant had in the meantime died. This gave rise to a singular point which was urged by Mr. Pierce. He contended, in accordance with a maxim of law, that, personally, an action died with the person. He said he had laid the matter before Counsel, who was of opinion that the action ought to abate with the death of Mr. Clark. He (the Counsel) further said that the Magistrates should be asked to say that, owing to the death of Mr. Clark, the proceedings should come to an end, and that, instead of giving judgment, they should postpone the matter until probate had been taken out. The Chairman (Sir Robert Egerton) said the Bench were advised that the claim did not abate by the death of the claimant. They thought that the charge of continuing to refuse to furnish a water supply had been proved, as from June 16, 1899, to June 24, both dates inclusive; and they imposed a penalty of £18, payable to the complainant's representatives, with costs. Mr. Pierce gave notice that he should apply for a case upon the points of law raised at the time the matter was argued, and upon the point raised on this occasion.

A Paltry Action Against the South Shields Gas Company.

At the South Shields Police Court last Wednesday, the South Shields Gas Company were summoned by the Corporation for opening up a street without giving the required three days' notice of their intention to do so, as required by statute. The Town Clerk (Mr. J. Moore Haytor) appeared for the Corporation; and Mr. C. W. Newlands for the Company. The Town Clerk stated that the Company opened up a pavement on Dec. 18 last, in Ocean Road, South Shields, without giving three days' notice, in accordance with the provisions of the statute. A foreman in the employ of the Corporation said he remembered seeing the pavement broken in Ocean Road on Monday morning, Dec. 18; and the Gas Company's workmen were there. Witness made a communication to the Borough Surveyor. Another witness stated that a notice was received from the defendants on the morning of Thursday, Dec. 21. Replying to Mr. Newlands, he said he did not think it was possible for the notice to have been delivered sooner, or overlooked in the office. Mr. S. E. Burgess, the Borough Surveyor, and other witnesses gave evidence, and they all were positive that the work was commenced on Dec. 18. Mr. Newlands said it had not been proved that the necessary notice had not been received at the office; and he adduced documentary evidence to prove that the work was commenced on Dec. 19. The Bench dismissed the case.

Charge of Falsifying Books and Embezzlement.

At the Lambeth Police Court last Wednesday, Frank Fairfield Norris, of Acacia Grove, West Dulwich, was summoned to answer the complaint of Howard Douglas Burn, that he, being an officer employed by the Directors of Frank Wright's Prepayment Gas-Meter Corporation, Limited, did, on various dates, "unlawfully and with intent to defraud, alter and falsify certain books of account belonging to his employers." There was a second summons against the defendant for embezzling money received by him on account of the Directors. Mr. Wontner appeared in support of the summonses; the defendant was represented by Mr. H. I. Sydney. In opening the case, Mr. Wontner said the complainants were a Company having offices in Glengall Road, Old Kent Road, and the defendant was the original Secretary, and was a man who enjoyed the fullest confidence of the Directors. In September or October last he went for a holiday; and while he was away it was determined to make an application to the Court of Chancery for an order for the reduction of the capital of the Company. The Auditors were called in for the purpose of this application; and, in consequence of what was then discovered, the defendant was asked for an explanation, and was eventually discharged. After dealing at some length with the details of the case, Mr. Wontner proceeded to call evidence in support of the summonses. The further hearing was adjourned for a week.

Embezzlements by a Gas Company's Manager and Clerk.

At Margate on Saturday, William Joseph Latchford, formerly Manager and Secretary of the Broadstairs Gas Company, appeared on remand, and pleaded guilty to embezzling £354, received on behalf of the Company. A remarkable feature of the case was that a clerk named Richard Henry Philpott came forward voluntarily and confessed to embezzling £100 of the Company's money without the knowledge of Latchford. The latter was sentenced to six months' and Philpott to one month's hard labour.

An Agreed Award under the Workmen's Compensation Act dealt with in the County Court.

At the sitting on the 14th inst. of the Ludlow County Court, before Judge Harris Lea, a claim under the Workmen's Compensation Act was settled. A man named Charles Smith met with an accident on the Birmingham Water-Works pipe-track at Ludlow, about five months ago, whereby he had to have his foot amputated; and as there was no dispute as to the facts, an arrangement had been arrived at. Messrs. Morrison and Mason, the contractors, were insured in the General Accident Insurance Corporation, Limited; the plaintiff had been paid 9s. 4d. per week; and an agreement had been signed by the Insurance Company and by Smith. There seemed, however, said Counsel appearing for the plaintiff, to be only two ways of dealing with the action. His Honour might make a formal award for the amount agreed upon, 9s. 4d. per week, or adjourn the case *sine die*. Having the Company's seal to the agreement, he was satisfied himself. His Honour said he could not make an award; and he would agree to the suggestion that the case be adjourned *sine die*. If the agreement failed, plaintiff could then come again to the Court.

MISCELLANEOUS NEWS.

THE DAMAGE TO GAS-MAINS THROUGH SEWERAGE OPERATIONS AT SHREWSBURY.

Arbitration Proceedings.

At the Shire Hall, Shrewsbury, last Tuesday, proceedings were opened in an arbitration with respect to a claim for the sum of £1583 made by the Shrewsbury Gas Company against the Shrewsbury Corporation as compensation for damage alleged to have been caused to the Company's mains, with consequent loss of gas, in carrying out the new system of sewerage in the town, to which reference was made in the "JOURNAL" last week (p. 486).

Mr. CORBET WOODALL was Arbitrator for the Company, for whom the Hon. A. LYTTELTON, Q.C., M.P., and Mr. SPEARMAN appeared. Mr. J. H. REDMAN was Arbitrator for the Corporation, who had retained Mr. F. A. BOSANQUET, Q.C., and Mr. A. GRAHAM to represent them. Mr. JAMES MANSERGH was Umpire.

Before the proceedings were opened,

Mr. GRAHAM said he had to make an application. His leader, Mr. Bosanquet, who arrived in Shrewsbury on the previous night, was unfortunately at that moment lying at his hotel dangerously ill; and therefore it was quite impossible for him to appear. Under these circumstances, he had to ask the Arbitrators to fall in with a suggestion made by Mr. Lyttelton that he (Mr. Lyttelton) should open the case, and call before them such artisan witnesses as would describe what they saw, and then adjourn the hearing to London, on a date to be fixed, when they could go more fully into the expert evidence with which they would have to deal.

Mr. LYTTELTON said he thought the course proposed by his friend was the best that could be adopted.

Mr. WOODALL having concurred,

A preliminary argument took place between Counsel on the subject of the inspection of plans, specifications, and account books.

Mr. LYTTELTON proceeded to open the case. He said the arbitration had been instituted, under section 308 of the Public Health Act, by the Shrewsbury Gas Company against the Corporation. The section specified that "where any person sustains any damage by reason of the exercise of any of the powers of this Act in relation to any matter as that to which he himself is not in default, full compensation shall be made to such person by the local authority exercising such powers; and any dispute as to the fact of damage or amount of compensation shall be settled by arbitration, in the manner provided by this Act." They would therefore have to determine whether damage had been caused to the Company's undertaking; and, if so, by whom, and what was its extent. These were the sole matters with which that tribunal was concerned. The Company was incorporated in 1820; and there had been two Private Acts passed since—one in 1878, which had added to their capital and increased their powers. During the past twenty years, he was informed by the Engineer of the Company, no subsidences or breakages had taken place in the mains, other than those caused by severe frosts and steam-rollers, until a rather recent date; and mains which were laid as far back as 1820 were found to be in remarkably good condition when inspected for contemplated improvements. It was a singular fact that the leakage of gas from 1879 to 1896, reckoning from June in each year, was only 5·125 per cent. of the entire quantity manufactured. In 1896, however, the Shrewsbury Corporation were empowered to carry out a sewerage system for the town; and from this period until the completion of it that uneventful history had unfortunately been changed. The result of the deep trenches which had been made for the sewerage had been the breaking of the Company's mains and services, the drawing of the pipes, sinkages, and so forth, entailing considerable cost in actual repairs, and a very large increase over the average leakage of the previous years. Particulars of the damage were furnished to the Corporation in 1898, after the works were completed, so far as they affected the claim; and the Contractor (Mr. Law) satisfied these to a certain extent. At that time (July, 1898), it was absolutely impossible for the Company to observe, or even estimate with any precision, what amount of damage and leakage had actually been caused. This was a matter which could only be ascertained after a considerable period. He did not propose at present to do more than give a summary of the matters of which the Company complained—leaving the details to be explained later on by the witnesses called. He would refer to only three conspicuous cases in which damage had been done. One was in the Berwick Road, where a 2-inch main sank laterally in consequence of the sewerage trenches; and it had to be raised and strengthened, and nearly every joint set up. No less than 116 joints had been more or less drawn. These pipes were 6 feet long. Then there was another case in Longden Coleham, in which, owing to frequent and bad breakages, no less than 170 yards of pipe had to be cut off for eight months; and so great was the subsidence, that the fronts of two adjacent cottages had to be propped up and subsequently rebuilt. Another similar case was in Castle Foregate, where the gas men had to investigate a leakage, and one of them actually sank into the ground up to his arm-pits. In the year 1895, the gas to be accounted for was 143,352,200 cubic feet, and the leakage was 8,282,617 cubic feet, or 5·8 per cent. In 1896 the quantity manufactured was 139,242,600 cubic feet, and the leakage was 8,034,004 cubic feet, or 5·75 per cent. In 1897 the make was 153,196,100 cubic feet, and the leakage 10,592,070 cubic feet—a percentage of 6·95. In 1898 the quantity manufactured was 154,254,700 cubic feet, and the leakage 12,819,746 cubic feet, or 8·34 per cent. In 1899 the make was 160,836,300 cubic feet, and the leakage 13,015,092 cubic feet, or 8·09 per cent. They would therefore see that the leakage had enormously increased since the sewerage works began. It was estimated that the Company had suffered damage to the amount of £1583 4s. 1d., and a claim was sent in for this sum; but the Council resisted it, and the Company now came before the Court and asked that it might be allowed.

Mr. MANSERGH: How much did Mr. Law pay for compensation?

Mr. GRAHAM: About £40.

Mr. LYTTELTON: That was for one place only. I am told it was a great deal more.

Mr. WOODALL: Was the amount paid by Mr. Law for damage to the pipes only, or was it for consequential loss as well?

Mr. LYTTELTON: So far as that part went, the claim was only for damage to pipes.

Mr. MANSERGH: Your claim for damage to the mains and for repairs is £178 15s. 1d. only?

Mr. LYTTELTON said that was so.

Evidence was then adduced.

Mr. *Charles Harris*, contractor, bore out substantially Counsel's statements with regard to the sinking of the Company's mains, the drawing of service-pipes, and other damage done during the years 1896, 1897, and 1898. These disturbances, he said, were clearly due to the sewerage operations. This was particularly the case at Porthill, Burton Street, Queen Street, and Berwick Road.

Mr. GRAHAM again raised the point as to what particulars he was entitled to receive from the Company, and contended that he had insufficient figures to enable him to check their claim. He said he should like to see the books, so as to ascertain the amount of capital expended during the last ten years, and the outlay on the repair and maintenance of pipes during the same period.

Mr. WOODALL: Might not that be confined to the distributing works?

Mr. LYTTELTON: Yes. We are willing to give that information; and surely it is sufficient for anybody.

Mr. GRAHAM said he understood the Company was one of those who paid maximum dividends, and also had a full reserve fund. Under these circumstances, he wished to know in what way they were spending their capital on the mains.

Mr. LYTTELTON said the accounts of the Company had nothing to do with the present inquiry. What did it matter whether they allocated capital to the extension of these mains or not?

Mr. GRAHAM: It is very easy to see the bearing of it.

Mr. LYTTELTON: It is for you to satisfy the Court, before they make the order, that it will assist them in making it instead of gratifying your own curiosity.

Mr. WOODALL: The Court is unanimous that it is unnecessary to furnish particulars beyond those in regard to the maintenance and extension of the distributing plant.

Mr. GRAHAM: But I am anxious to get particulars of the amount of coal consumed and the gas made per ton. It is obviously material that we should be able to test the Company's statements in that respect.

Mr. MANSERGH: Well, get it from the Engineer in cross-examination. We have already ruled as to what you are entitled to, and surely that is enough.

Henry Mansell said he had been in the service of the Company for 40 years, for 18 of which he had been outdoor inspector. He had to examine the men's books; and the time put in, and the material used, in the repairs in question were accurately stated. He supervised these repairs. At Porthill, there was considerable subsidence through the sewerage trench. The gas-main had sunk, the joints had been drawn, and there was considerable escape of gas. The main was from 2 to 3 feet deep. There was no such sinking of the main before. In Queen Street and Burton Street a similar state of things was found. The mains were very uneven and broken in places, and the services on one side of Burton Street had all gone down. At Coton Hill he found drawn joints, sinking, and so forth. There had been no difficulties before the sewerage operations; and these were plainly the cause of the damage. In Chester Street, where there had been no trouble before, they found sinking and loosened joints. The next place he inspected was Longden Coleham. There he found drawn joints, a broken main, and matters so bad that he had to cut off 120 yards of the main and provide a substitute in another part of the road. The subsidence was so great that two adjacent cottages had to be propped up and subsequently rebuilt; and on the opposite side the pavement of the footpath gave way. About 20 yards of 4-inch pipe had entirely disappeared. The same remarks applied generally to Castle Foregate and other places. Before the sewerage works began, they never had any trouble in any of the places referred to.

Witness was cross-examined at considerable length by Mr. GRAHAM. He admitted that the Company's mains had occasionally to be repaired before the sewerage operations commenced; but he adhered to his original statement that, generally speaking, they were in capital order, and needed very little attention. Some difficulty had been experienced with a new 15-inch main through the town, as well as with a specially constructed main, over the English Bridge, which was near the surface; but the leakage from these was comparatively small. He repudiated the idea that the Company's mains were so bad at one point, where there was no sewerage, that on the soil being thrown up and a light put against it a flame at once burst forth.

On the resumption of the proceedings next day,

Mr. *Henry Lyne*, Assistant-Manager at the Cork Gas-Works, and formerly of Shrewsbury, and *William Waite*, main and service layer in the employ of the Gas Company, gave corroborative evidence; as did also *Henry Gill*, another workman.

Mr. *W. Belton*, the Company's Engineer and Secretary, next gave evidence. He verified various items of account, including the charges made for the repairs, and also the statements as to the damage done by the sewerage operations. The sum of £178 had, he said, been claimed for repairs; and the remainder was for leakages and matters relating directly thereto. It was true that there were leakages before the sewerage works were commenced, and it would be impossible to have a gas-supply system in which there were not; but up to 1896 there were none of the special matters of complaint to which he had spoken. He had formed a decided opinion that the various damages had occurred in consequence of the subsidence arising from the sewerage operations. The statement of claim was based on the actual cost, without regard to what would be inevitable loss from the same causes in future.

In cross-examination by Mr. GRAHAM, witness said the Company declared maximum dividends, and these, with all arrears, had been paid up to date. They had a reserve fund, but this was disposed of; and the capital, so far as their powers to raise it went, had also been exhausted. He considered that the Company had been damaged. For the past ten years, the average amount spent on the works and mains per 1000 cubic feet of gas sold was 8·6d. This might appear very high, but considerable alterations had been carried out. They had charged the Corporation the same

price for the estimated leakage as they charged their ordinary customers for gas. But various points were taken into consideration, and it was thought that if the matter were settled amicably that price could be re-adjusted. The cost of manufacture per 1000 cubic feet was about 23·98d., without any deduction for residual products. These amounted from 5·61d. to 6·11d. in the last three or four years. There had been fluctuating leakages before the sewerage operations commenced; but they averaged only 5·125 per cent. From 1897 to 1899, however, the leakage went from 6·95 to 8·09 per cent. There was a slight decrease on the last half year. Their returns during the past few years showed a greater amount of production per ton of coal used; but this was due to improved works. A suggestion had been made that greater pressure had caused increased leakage in the new mains where the sewers did not run; but he denied that this was the case. The consumption had augmented in greater proportion to the extension of the mains; but though the pressure was greater in one place it was less in another, and this had a counterbalancing effect, and practically the whole pressure remained as before.

Mr. *H. E. Jones* said he had inspected the Company's mains at openings at the various places mentioned in the borough, and found them in good condition, and laid at a proper depth. The soil was mostly of such a nature as to need special precautions in carrying out sewerage works; and in some places in Shrewsbury which he had examined, he believed it was physically impossible to conduct such operations without disturbing the subsoil to such an extent as to affect the gas-pipes—not only those directly in the trench or close to it, but even those at some distance. He had not the slightest doubt that the damage which had been described was due to the sewerage works, and that further trouble would ensue from the same cause.

In cross-examination, witness said that, all things considered, he thought Mr. Belton had taken very moderate estimates in arriving at the amount he had claimed, although the price charged for the gas might be a matter of opinion. He agreed with Mr. Belton that, under the circumstances stated, the higher pressure would not cause increased leakage from the mains.

Mr. *G. F. L. Foulger*, Chief Distributing Engineer of the Gaslight and Coke Company, said he had visited several places in the town where the gas-pipes had been laid. At the parts where the sewerage work had not been in progress the pipes were very good, and not the slightest sign of escape, either past or present, was noticeable; but where sewerage operations had been going on, he observed that some of the mains had been recently repaired. The ground was particularly loose underneath the pipes, and it was a very easy matter to drive a bar down into the soil; but the pipes were in perfect condition. In Castle Foregate there was a slight escape from the 10-inch main, and the soil was particularly loose—due, no doubt, to the sewerage works. He thought it would be impossible to carry out an extensive system of sewerage without doing some damage to gas-pipes; but measures might be taken to reduce it.

Mr. *J. T. Wood*, of Liverpool, who had examined the places in dispute, said he found evidence of sinking and leakage which were clearly due to the sewerage works. The old pipes were in very good condition, and, if undisturbed, would be practically indestructible.

This concluded the evidence for the Company; and the inquiry was adjourned till the 5th prox., in London.

A question arose as to the furnishing of reciprocal plans showing both the gas-mains and the sewage-mains; and Mr. Mansergh said the parties must agree to provide these, as the expense involved would be quite incommensurate with the amount claimed. He added that he was almost ashamed to sit there with his two colleagues on such a paltry claim.

THE LEEDS CORPORATION GAS COMMITTEE AND CARBURETTED WATER GAS.

From a statement appearing in a local contemporary, it would appear that the members of the Leeds Corporation Gas Committee who have been visiting London and Brighton for the purpose of inspecting carburetted water-gas plants have returned home favourably impressed with the advantages of the system. It is therefore expected that the City Council will shortly be asked to sanction the erection of plant capable of making 2½ million cubic feet per day, at an estimated cost of £30,350. It is the rapid growth of Leeds that forces the Chairman of the Committee (Alderman Lowden) and his colleagues to look ahead. The present capacity of the gas-works collectively is equal to a production of 17¼ million cubic feet a day. The maximum daily consumption last winter for the whole of the city was 15 million feet; and, consequently, the Committee possess a surplus producing power of 2¼ millions, or 15 per cent. The new retort-house which is being erected at the York Street works will, however, make a substantial addition to the total power of production. As regards the future demand, it is difficult, owing to the competition of the electric light, to forecast the sales with any degree of certainty; but, making allowance for this rivalry, and taking into consideration the fact that the gas distribution system is being quickly improved, the General Manager (Mr. R. H. Townsley) anticipates an increase during the next three years of at least 5 per cent. With the additions now being made at York Street, he is of opinion that the works are fully equipped to meet the demands upon them for the next three winters. With respect to possible extensions, it is pointed out that, on the available land in the possession of the Committee in Meadow Lane, carburetted water-gas plant could be laid down equal to a daily output of 2½ million feet. It is also feasible, by making alterations and additions to some of the old retort-houses at the Meadow Lane and New Wortley works, to increase the producing power of these works by at least 2 million feet per day; making an additional total of 4½ million feet a day, which will last the city through the winter of 1905-6. Latterly, complaint has been made that the quality of Leeds gas has not been up to the usual standard; but this fault arises, according to an official explanation, from scarcity of cannel coal. All the stocks of this enriching fuel at the works were exhausted weeks ago; and the management have the greatest difficulty in obtaining even the smallest daily supply. A carburetted water-gas installation would, it is claimed, lessen, if not remove entirely, the anxiety of both the management and the Committee in maintaining a high and uniform quality of gas.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Sir Edward Lawrence in the chair.

The Secretary (Mr. P. F. Garnett) read a formal report recommending a dividend at the rate of 5 per cent. on the "A" stock and of 3½ per cent. on the "B" stock, after providing for the debentures.

The Chairman, in moving the adoption of the report, said the payment of the dividends recommended was warranted by the working of the Company; and he thought he might venture to say this much—that rarely had they submitted a more favourable report than the one for the last six months. The increase in the consumption of gas for the half year ended Dec. 31 was about 3½ per cent. and the price received for residuals was very considerable—very much in excess of what the Directors had dared to estimate in preparing their figures in July last. This statement would be very satisfactory to the shareholders, especially when he added that so far during the present year these good results had been continued. In fact, the consumption of gas for the last six weeks had been something very large indeed. Perhaps it might suffice if he stated that the increase the previous week over the corresponding week of last year amounted to no less than about 15½ per cent., which was one of the largest increases, if not the very largest increase, of which the Company had any record. These things he mentioned in order that the shareholders might know the Company were doing well. They had, however, troubles, in spite of this prosperity—troubles which caused their Engineer a great deal of anxiety. These troubles were mainly connected with the delivery of coal. As the shareholders knew, great complaints had arisen in all parts of the country in reference to the inability of gas and other companies who had contracted for large quantities of coal to obtain its due delivery during the winter. Large colliery proprietors with whom this Company had extensive contracts had failed to regularly send in the coal which had been contracted for, and which was really required in order to keep up the supplies of gas. In spite of these anxious troubles, however, the Company had been enabled keep up the pressure and quality of their gas throughout the winter; the public never having had to suffer, either as regarded pressure or quality, in the slightest degree. Such results could not be claimed by all gas companies in the North of England, some of whom had been placed in rather difficult positions owing to failure in the supplies of coal. The Liverpool Gas Company did not take any special credit for having succeeded better than other companies; they might have been better treated, or have been more fortunate. But at any rate, they had been able to discharge their obligations without the slightest delay. The uncertainty about the delivery of coal had, however, given the Directors much cause for anxiety. As the shareholders knew, the Company were hampered for want of storage room for coal; and the absolute necessity for increasing the storage space had been so forced upon the attention of the Directors by recent events, that they had already secured an additional plot of land adjacent to one of their works. This would not make the Company altogether independent of the contracting colliery companies, but it would, at all events, relieve to some extent the anxiety always felt at the commencement of the winter, when through frost or fog the deliveries of coal began to fail. As to the next half year, of course, they could not hope that things would go on as satisfactorily as during the past six months; for it was only right to point out that the price of coal was higher than it was twelve months ago, while in the course of the next month or two the Directors would be advertising tenders for further supplies. It was impossible to forecast what the future price of coal would be; but it must be very considerably in excess of what the Company had been paying during the past few years. Therefore, although there was a very rosy side to the current working, he feared they would find a very adverse account during the succeeding year, for, whatever might be the course of events in the next few months, the price of coal could not be expected to reach nearly the level of last year. Already certain of the gas companies in England had raised their price for gas. Some were probably in small places—still, they afforded an indication of what was going on; and even in Durham, situated close to the coal-fields of the north, they had felt obliged to raise the price of gas by 3d. per 1000 cubic feet. So, while the Liverpool shareholders took the bright side of their Company's account, let them recollect that there was a darker side. All he could say was that the Directors would continue to give the best attention they could to the interests of the Company, both as regarded shareholders and consumers. Even if it became necessary to raise the price of gas, consumers might depend upon it that the Directors would only advance the price under very urgent necessity—not, indeed, until the necessity was absolutely forced upon them would the Directors wish to think of making any change in the present price. He had been in hopes at the beginning of the year that there was such a bright time coming as might lead them to see a fresh record in the price of gas in Liverpool; but the events of the past year were events which combined prosperity with a great deal of care and anxiety. These events had tended to raise the price of coal from which gas was mainly manufactured; and therefore the Company could not hope to work under the same favourable conditions as during the last few years. He moved that the report be adopted.

Mr. James Lister (the Deputy-Chairman) seconded the motion, which was unanimously adopted; and the dividends specified were declared.

Mr. Alfred Tyrer, in moving a vote of thanks to the Chairman and Directors, took an optimistic view of the future of gas companies, quoting figures to show the steady growth in the consumption of gas despite the competition of the electric light.

Mr. James Birkett seconded the motion; and the vote was accorded.

The Chairman, in reply, said: I hope no one will think we have the slightest intention now of raising the price of gas. I only thought it right that, having given you the bright side of the picture, I should put the dark side before you as well.

The workmen employed by the Shanklin Gas Company had their annual dinner (provided by the Directors) on the 15th inst., in the Board-room at the offices. The Vice-Chairman of the Company (Mr. R. Young) presided. After dinner, a long toast-list was gone through; and a very enjoyable evening was spent.

TOTTENHAM AND EDMONTON GAS COMPANY.

An Appreciation of the late Mr. W. H. H. Broadberry—Mr. Corbet Woodall on Current Gas Topics—Additional Capital to be Raised.

The Half-Yearly Meeting of this Company was held on Saturday last, at the Offices, Willoughby Lane, Tottenham—Mr. Corbet Woodall in the chair.

The Secretary (Mr. James Randall) read the notice convening the meeting; and the Directors' report and the accounts, of which an abstract appeared last week, were taken as read.

The Chairman, in addressing the proprietors, said the report having been in their hands, they would not be surprised to find that he had again to open the proceedings by referring to a grave, personal loss which the Company had sustained since the last meeting. It was not this time a Director who was absent from his accustomed place; but they missed from among them the chief officer of the Company, who had been its guiding spirit to a large extent for 25 years. During the whole of that time, Mr. W. H. H. Broadberry was associated with their friend Mr. Randall, and during a large portion of it with his own son, in the management of the Company's affairs; but practically he was the active governing spirit of the concern for many years. Mr. Broadberry was of a class which he thought this nation produced more than any other. In spite of the deplorable absence of means of technical education in the days in which he was getting his training, he became fully and completely master of the business to which he gave himself—not simply as a good commercial Manager, but also acquainting himself thoroughly with the technical details of it, and, to a large extent, the more scientific applications of it; so that he was able not only to keep himself in line with the development of the gas industry, but also to help it forward in no small degree. In Mr. Broadberry's time the business of the Company increased sixfold. It was lifted from 91 million cubic feet, the amount distributed in the first year of his management, to 575 million cubic feet, the quantity sent out last year. Whatever the future of the Company might be, he (the Chairman) felt quite sure that the name of Broadberry would be honourably associated with the story of its prosperity. He suggested that the meeting should record its grateful sense of the indebtedness which they owed to Mr. Broadberry during his long service with the Company.

The proprietors endorsed the proposal by silently rising.

The Chairman (continuing) said, in succession to their late friend, the Directors had appointed his son (Mr. Arthur E. Broadberry). Their new Engineer had had many advantages that were denied to, or were beyond the reach of, his father at the outset of his career; and he had also had the benefit of being associated with his father during the years of his ripe experience. The Board therefore felt very confident that the work which the father had begun, and carried on for so many years, would be safe in the hands of his son. He had yet to prove himself; to win his spurs. But he (the Chairman) was sure Mr. Broadberry had the sympathy of the proprietors at the outset of his career, and he might have the confident expectation of the most sympathetic helpfulness on the part of the Directors. Proceeding to move that the report and the statement of accounts be received and adopted, the Chairman said there were a good many things he should like to say, but on the present occasion he preferred to restrain himself. As an industry, they were looking forward somewhat anxiously to the next six months. There would be proceedings in Parliament of a character that would possibly affect very seriously the future of many gas companies, especially those in London and its suburbs; and in view of this, possibly the less said the better at the present time. What he did sincerely hope was that the system of legislation under which the Company had so far worked, and under which it had done exceedingly good service, would not be lightly disturbed or altered. The report for the half year was, on the whole, satisfactory. The most gratifying item was the one which showed that, during the six months, they had had an increase of more than 28 million cubic feet in the quantity of gas supplied, or 10¾ per cent. At this rate, the business would double in something under seven years. This was not a one-sided matter for congratulation. It was very satisfactory to know that the business was growing; but they had to recognize the fact that a large amount of money had to be spent in order to keep in line with this rapidly increasing demand. It was, however, pleasing to know that, while the business was growing very fast, their capital was not growing in the same ratio—that the new business was being obtained at a less expenditure of capital than had to be spent upon the old business. This was the more gratifying when they remembered that the new business was made up to a large extent in a very costly way. He had on previous occasions referred to the heavy capital charge involved in the new business that was obtained through prepayment meters and the gratuitous fitting up of consumers' premises. He noticed that the number of slot consumers was now 8082; while the ordinary consumers numbered only 7901. So that this business—the growth of a comparatively few years—had now outrun the business that had taken half a century to build up on the ordinary lines. It would be palpable to all the shareholders that, while they had doubled the number of consumers, they had not doubled the amount of gas sold, because the new customers under the prepayment system were smaller consumers on the average than those who used ordinary meters. Upon these new consumers, however, there had been an expenditure larger than would have been made upon ordinary ones; but in spite of this, they were able to say that the amount of capital in proportion to the business done was less than it was in 1889. It so happened also that the past ten years had just seen the doubling of the business of the Company. Although these figures were met with so often, he could not get used to them. It was, indeed, very surprising to find that a period of ten years was sufficient, in a district like theirs, to double their whole output. The economy in the expenditure of capital, and the cheaper rate at which the capital was raised, was shown in the fact that, while in 1889 it cost 1s. per 1000 cubic feet to pay the dividends, in the past year, if the proprietors approved of the dividends recommended by the Directors, the whole charge against the price of gas would be only 8·7d. So that upon this item there was a saving of 3·3d. to the consumers. Dealing with the items of expenditure in the revenue account, he said the proprietors would possibly have noticed that there had been an increase of nearly £6000 in the cost of material from which the gas was made—that was, in the coal and in the oil and coke that was used in the manufacture of the carburetted water gas. As against this £6000, they had received, in the increased value of residual products sold, £2600; so that the net increase in the cost of materials was about £3300. Then there had been some economies. Slightly less had been spent on repairs of works; but the corresponding half year was a very heavy one in this respect. Some other economies had also been effected; the net result being that, after providing for the dividend upon the increased capital, they were able to carry forward some £700 more than at the end of the corresponding half of 1898. So much for the past. With regard to the future, it would be affectation to say the Board regarded it with perfectly easy minds. There was no doubt whatever that, judging by present appearances, they would have to pay more, under the new contracts, both for coal and oil, than they had been doing. He hoped the amount would not be so large as indications at and about Christmas time led them to expect. But whatever the additional cost might be, one thing the Directors were quite resolved upon, and that was they would exhaust all the resources they had before they proposed to increase the price of gas in order to meet it. The Directors would struggle, and they would ask their officers to struggle with them, to do everything possible to reduce expenditure. They would be very careful—as careful as they could be—as to the purchases they made; and if it should happen that an increase in the price of gas had to take place, it would only be as a last resort, which would be resisted as long as possible.

Mr. James Warren seconded the motion, which was unanimously carried.

Mr. D. Ford Goddard, M.P., moved the declaration of a dividend at the rate of 6 and 4½ per cent. per annum respectively on the "A" and "B" consolidated stocks.

Mr. H. Bailey seconded the motion, and it was carried unanimously.

An Extraordinary Meeting was then held to consider the question of the issue of further capital.

The Chairman moved that the Directors be authorized to raise, in accordance with section 17 of the Company's Act of 1898, all or any part (as they thought fit) of the money they were empowered to raise on mortgage by the creation and issue of £44,900 debenture stock. He remarked that it might be within the memory of some of the shareholders that, prior to the passing of the Act of 1898, they had borrowed, on account of the capital raised, the amount of £55,100. It would be remembered that the nominal capital of the Company was increased, and the rate of dividend was decreased. At the same time, they obtained from Parliament the right to issue one-third of the amount of the converted capital as debenture stock. There was some mild opposition to this proposal; but it arose entirely through ignorance of the operation of it. When a large amount of capital was raised at a low rate of interest, it was to the advantage of the Company and very much to the advantage of the consumers, because they had only to pay a low rate of interest upon it. The amount of increased money they were authorized to borrow by reason of the Act of 1898 upon the old capital—not upon the new—was £44,900; and his proposal was that the Directors be authorized to raise this. It was right he should justify the application for leave to raise more capital by showing what the Directors were going to do with it; but having already said that, if they continued to progress at the rate they had been doing, the business would be doubled in seven years or less, it went without saying that they would spend in this period a large amount of capital. He did not say they would have to double the capital, but they would have to raise a large sum—very much larger than they were asking authority to raise that day. In the present year, a new retort-house would have to be built; and they would have to take in hand the erection of a large new gasholder. Then with the increase in the demand for gas, many additional mains would have to be laid, new meters connected, and a large number of new houses fitted up. The Directors had decided to fix the minimum price of the 4 per cent. debenture stock at 115.

Mr. James Warren seconded the motion, which was agreed to.

Mr. Goddard next proposed that the Directors be authorized to raise, in accordance with section 6 of the 1898 Act, the sum of £75,000, being a moiety of the additional "B" capital consolidated stock; and under section 18 of the same Act, to create the sum of £25,000 of additional stock, being one-third part of the borrowing powers in respect of the additional "B" capital.

Mr. H. Bailey seconded the motion, which was at once unanimously carried.

The Chairman said he would remind the shareholders of the fact that the amount of debenture stock they were issuing was one-third of the amount of the ordinary stock, instead of only the one-quarter they were empowered to issue prior to the passing of the last Act.

Mr. J. L. Chapman, proposing a vote of thanks to the Directors and officers, remarked that, in the few years that many of the proprietors had been connected with the Company, it had grown from a medium-sized concern to one of quite colossal size; and they could appreciate how great had been the difficulties and work of the Directors. While speaking, he should like to say how much he, with many of those who were connected with the gas profession, felt the loss of their friend Mr. Broadberry. He had known him, he might almost say, since he was a boy, had respected him highly, and had found in him a true friend.

Mr. W. B. Randall, in seconding the motion, also spoke of the estimation in which Mr. Broadberry was held in the gas profession.

The motion was unanimously agreed to.

The Chairman responded; and, referring to the officers, he remarked that, while every winter was a fairly trying time for the chief officers of a gas company, he did not think that ever in his experience he had known one that had been more trying than this. Throughout the country, there had been the greatest difficulty in getting materials to carry on the manufacture; and, in their own case, they had been reduced to—he would not say how many days' supply of coal, and how many (he might almost say) hours of oil. Mr. Arthur Broadberry had spent a Sunday promenading up and down the side of the canal, watching for a barge of oil that never came; and he felt that the proprietors owed him their full sympathy. The officers had met the requirements made upon them during this winter; and the proprietors might rely upon them to meet the contingencies in the days to come.

The proceedings then terminated.

BROMLEY GAS CONSUMERS' COMPANY.

The Half-Yearly Meeting of this Company was held on Thursday, at the Bell Hotel, Bromley—Mr. ALEXANDER DICKSON in the chair.

The SECRETARY (Mr. H. W. Amos) having read the notice convening the meeting, the report of the Directors, with the accounts for the six months ending Dec. 31, 1899, an abstract of which appeared in the "JOURNAL" for the 13th inst., was presented.

The CHAIRMAN, in proposing the adoption of the report and accounts, remarked that the good progress of the Company was very satisfactorily shown by the increase in the make of gas, which, taken over the whole year, amounted to nearly 11 million cubic feet over 1898. In looking down the statement of accounts, they would see that, under the head of gas, the make for the past half year had been 125¼ million cubic feet; and this was something like 8 millions more than in the corresponding half of last year. Unaccounted-for gas was a little higher than in the previous half year; but he would remind them that this item covered variations in the gas in stock in the holders, which were not taken into account, and it also covered the variations, such as they were, in the dates of taking the different registers of the meters. Turning to the capital account, they would be, as he was, very pleased to notice that the expenditure there was comparatively very small. They would be glad to see that expenditure remain small—at any rate, until the capacity of the works which they had in reserve was actually required for the purposes of the Company. The revenue for the half year amounted to £24,921, as against £23,191 for the corresponding period of last year, which gave them an increase of £1730 on the half year. Of this £1730, about £789 was from the increase of gas-rental, £534 from coke, £221 from increased make and better price of sulphate of ammonia, £71 from tar, and £115 from sundries. On the expenditure side of the account, they had a total of £17,422, as against £15,914 last year, which was an increase of £1508. Dealing first with the items which were in excess as compared with last year, they had had to spend £1668 more in coals. They had laid out in repairs of mains and services an additional £156; on stoves, fittings, and purifying, £181; and there was also an increase in the wages item and small sundries of £2123. Against this, they had some diminished items. Works and retorts cost £198 less, and rates and taxes £414 less. The latter, however, was a matter of account, as the income-tax was now a charge on the profit and loss account, instead of on the revenue account, as it used to be. In the result, they had a profit on the revenue account of £7500; and this was subject to the net amount of interest to be paid, which was £644, and so left them £6856 available. Their dividends of 12 and 9 per cent., with the additional amount that they had to include for the full half-year's dividend on the new shares raised in the spring of the year, amounted to £6555; so that they closed the half-year's account with a surplus of some £300. Carrying this forward to the previous surplus, they had a balance of £2348, in addition to the reserve fund of £6450. In closing the accounts, they had taken the precaution to value their stocks at very low figures, and had also written off very fully every item upon which they felt that a depreciation charge ought to be made. In this sense the accounts were made out as favourably from the permanent point of view as they could possibly wish them to be. Of course, the principal item of interest in the accounts was the question of coals. The very trying conditions of the present coal market had apparently arisen from the unwonted, if not actually unprecedented, activity which had prevailed in every branch of the manufacturing metals market, and in all businesses where coal was required. Under their contracts, they had fortunately mitigated the hardship of the extreme exactions, unless they had to face anything in the future worse than they had experienced hitherto. Whether prices would tighten or whether they would slacken, it was at present almost impossible to say; and prophesying was a very dangerous practice, so he did not propose to follow it. There was one thing which he thought they would all concur in, and that was that an advance in prices of commodities which arose from, or was accompanied by, a general prosperity throughout the whole country, was not altogether undesirable or unwelcome, because when everybody had more to do and got more for doing it nobody grumbled, and if everybody's commodity went up in price and it should happen that gas would have to go up somewhat, it would not be regarded as in any way unreasonable. However, they had not contemplated any change of this kind; and they hoped to be able to weather the storm without having to contemplate it. They rather felt that in giving the public the improved public lighting which the town now possessed, and in giving the consumers a good and sufficient supply of gas at the same rates as were prevalent when coal was so much cheaper, they at least had not been unsuccessful in the principal object of the administration of the gas industry—namely, to accommodate the public at the lowest possible price. That a certain section of coal should within the last two or three years have increased in price something like 200 per cent., would have been thought almost incredible; but nevertheless it had happened. He did not know that they had had any more pleasant time of it than neighbouring gas companies. They had seen by their statements in public that most of them had been in a tight corner; and they had, of course, had their times of anxiety. In the dark days before Christmas, when the delay in the delivery of their coal was causing them some anxiety, they found themselves with three days' stock in hand. He need not say that they dealt with this emergency at once, and immediately purchased a fortnight's requirements at higher prices, over the heads of their contractors—being determined that they should not run any risk with regard to the town or district. He merely mentioned this fact as one perhaps of interest to the proprietors, as showing, with regard to the Directors' claim to their confidence in conducting the business for them, that they acted promptly, and succeeded in tiding through an emergency which had caused many others great inconvenience. Some of them might, perhaps, after having read the report, have the question on the tip of their tongue as to why they had made no mention of the matters which were *sub judice* between the Crays Company and themselves. The simple reason was that these matters were practically precisely where they were when he addressed them at the last half-yearly meeting; and the reasons which then induced him to ask them to allow him not to say anything in public upon the points in dispute, were still applicable.

Mr. B. H. LATTER seconded the resolution; and it was agreed to.

The CHAIRMAN proposed that the dividends, as recommended in the report, be declared; and this was seconded by Mr. JANSON and carried.

Messrs. A. E. Willett and A. S. Gedge were then unanimously re-elected Directors; and Mr. W. W. Baynes was re-appointed Auditor.

Upon the proposition of the CHAIRMAN, seconded by Mr. JANSON, it was agreed to increase the salary of the Secretary by £50.

The CHAIRMAN, in reply to a hearty vote of thanks, bore testimony to the admirable services of the chief officers and staff. They had, he said, recently made a recognition of Mr. Woodward's sterling services to the Board during the past year, and could only express their thanks to Mr. Woodward and Mr. Amos for their very great care and industry in protecting and promoting the best interests of the Company. He moved a cordial vote of thanks to all the officers and staff.

Mr. B. H. LATTER seconded, and the vote was unanimously accorded.

Mr. WOODWARD, in reply, mentioned that the past year had not been a bed of roses for any gas engineer; they having experienced very trying times, as coal was almost impossible to get. They had now better materials; and the works were going on as well as possible.

Mr. AMOS also returned thanks, on behalf of the staff, for the expression of confidence, which, he was sure, would be appreciated.

The proceedings then terminated.

ASCOT DISTRICT GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday last, at the Offices, No. 46, Cannon Street, E.C.—Mr. ROBERT BERRIDGE presiding.

The SECRETARY (Mr. W. A. Schultz, F.C.A.) having read the notice convening the meeting,

The CHAIRMAN moved the adoption of the report and accounts. He said the shareholders would see from the report that there was a profit of £1290, as against £984 for the corresponding half of the previous year. After providing for every charge against the half-year's working, there remained a balance of £1796 at the credit of profit and loss. Out of this, they recommended the payment of a dividend at the rate of 4½ per cent. per annum. This was a very great improvement; and they could easily have paid 5 per cent. The state of the coal market, and other considerations, however, made it inadvisable to divide more than the amount the Directors recommended. After payment of the dividend, there would remain to be carried forward a sum of £867, as compared with £654 in the corresponding half year. This result the Board considered very satisfactory; it was better than anything the Company had ever before experienced. The revenue showed an increase of 22½ per cent. over the corresponding half of the previous year. The capital account had been slightly increased. It stood now at £49,161, as against £48,521 at Dec. 31, 1898. The capital expenditure per ton of coal carbonized was £21 6s. in the past half year, as compared with £22 15s. in the corresponding six months of the previous year; and per 1000 cubic feet of gas made, it was £2 1s. 5d., as against £2 4s. 6d. The gas made in the half year under review was 12,630,000 cubic feet, as compared with 11,559,000 feet in the December half of 1898; while the quantity sold was 11,488,100 cubic feet, as against 9,817,100 feet. This showed an increase in the quantity of gas sold of 1,671,000 cubic feet, or about 17 per cent., which was a very good result indeed. The gas sold per ton of coal carbonized had increased from 9000 cubic feet in 1898 to 9416 feet in the past half year; while the unaccounted-for gas had been reduced from 12·5 to 8·1 per cent. The amount received for coke per ton of coal carbonized was 7s. 6d. in the past six months, as compared with 4s. 10d. in the corresponding period; while the amount received per ton of coke sold (less expenses) was 15s. 9d., as against 12s. 7d. The ordinary consumers had increased from 361 in 1898 to 375 in the past half year, while the prepayment consumers had increased from 76 to 94. In 1898, there were 79 stoves on hire; now there were 123. The number of public lamps, too, had grown from 69 to 91. He thought it would be well to say a few words about the remuneration of the Secretary during the change of management. Their late Manager (Mr. Hicks) was obliged, owing to the death of his father, to leave them very suddenly. During the time that elapsed before they could find a suitable Manager, the Secretary had much additional work to perform; and for this, as would be seen from the accounts, the Board had paid him something extra. The item for stationery and printing (£43) might appear somewhat heavy; but he would like to explain that this was caused by the writing off of some old books in the office which were absolutely useless to the Company. Another very important matter which he wished to bring before the shareholders was the question of the gas-works at Bagshot. Bagshot was situated entirely within the district of their Company. The Ascot Company had power to lay their mains through Bagshot, which was an important place. The Bagshot works lit the whole of Bagshot Park, the Duke of Connaught's Estate; and they had a good amount of public and private lighting. The Directors made a special visit to Bagshot, and found the works very dilapidated. They had tried to ascertain what amount would be accepted for them, but up to the present had not been successful. It was announced that the works would be sold by auction by Mr. Alfred Richards on March 6. What the Directors would do, they did not know at present; and nothing final would be decided without consulting the shareholders. His view was that, so long as Mrs. Kemp (the widow of the late Manager and owner) continued to carry on the works, their Company ought not to interfere; but if they were disposed of to an outsider, then the Directors would be prepared to recommend that they should take their mains through Bagshot. By doing this, they would very much improve their position. They would be able to go through Windlesham, from there to Bagshot, and from Bagshot to the top of Bracknell. In this way, they would get a complete circuit, which was an advantage in the matter of economical working. Bagshot was about 2½ miles from Ascot.

Mr. HENRY WOODALL said it would be rather hard on the purchaser if the Company entered the Bagshot district after he had bought the works.

The CHAIRMAN replied that they had written to the Auctioneer, and were going to communicate with the lawyers. Another important question he had to bring forward was the Secretary's salary. When Mr. Schultz was appointed Secretary, the Company was only paying 3 per cent. dividend; but they were now able to pay 4½ per cent. The Board

therefore proposed that the salary of the Secretary should be increased from £75 to £150 per annum.

Mr. ALFRED KITT seconded the motion, which was carried unanimously.

The dividend recommended was then declared, and the increase of the Secretary's salary was agreed to.

The SECRETARY having briefly thanked the shareholders,

The retiring Director (Mr. Alfred Kitt) and the Auditors (Messrs. T. A. Welton and F. Bridges) were re-elected. It was stated that the remuneration of Mr. Welton would in future be at the rate of 20 guineas, and that of Mr. Bridges at the rate of 10 guineas, a year.

Dr. STRONG proposed a vote of thanks to the Chairman, Directors, and staff.

Mr. WOODALL, in seconding the motion, said he had looked carefully through the accounts, and thought they were of a most gratifying character. The increase in the number of consumers was not very great; but it was palpable that much had been done to improve the quality of the customers, which was better than getting new ones. The way in which the capital account was coming down in relation to the quantity of gas sold, was very gratifying indeed.

The resolution having been carried unanimously,

The CHAIRMAN, MANAGER (Mr. A. E. Brooks), and SECRETARY returned thanks.

This concluded the business of the meeting.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. CHARLES HORSLEY, J.P., the Deputy-Chairman, presiding.

The SECRETARY (Mr. Ernest W. Drew, F.C.A.) having read the notice convening the meeting, it was agreed to take as read the report and accounts.

The CHAIRMAN, in the first place, explained that he was presiding that day because, he regretted very much to say, their Chairman (Mr. James Glaisher) had been suffering for some time from bronchitis. He also referred to the earnestness with which Mr. Glaisher devoted himself to the Company's interests, and to the genial manner in which he worked with his colleagues on the Board. He was certain the shareholders would join with him in sympathizing with their Chairman, and in an expression of hope that he would soon be with them again. (The shareholders cordially endorsed these remarks.) Turning to the accounts, he remarked that he considered the gas undertaking was in a very satisfactory state; and, when he informed the shareholders that the increase in the consumption of gas during the half year was equal to 7½ per cent., they would agree with him that the business was progressing at a very gratifying rate. The quantity of coal carbonized during the half year was 4754 tons, which was an increase of 356 tons compared with the corresponding half of 1898. The production of gas was equal to 10,951 cubic feet per ton of coal carbonized; and the quantity sold averaged 9942 cubic feet. This, he considered, was exceedingly good working, and reflected the greatest credit on the management of their Engineer (Mr. T. H. Martin, Assoc.M.Inst.C.E.). The coke made was equal to a chaldron per ton (of 21 cwt.) of coal; and the yield of tar was about 11½ gallons per ton. The net gas-rental amounted to £8833; and the expenses, less sales of residuals, &c., to £4825—leaving a profit of £4008. To this had to be added the profit on meters, £161, which gave them a gross profit of £4169. The plant was in good working order; and the new large gas-holder which they had erected was working satisfactorily. Dealing with the figures of the water undertaking, he said the gross rental amounted to £11,494. A number of detailed charges, of which pumping was the largest item, made the total working expenditure £6748; leaving a profit of £4748. This, with the profit on the gas undertaking, gave them a total of £8917. If they declared the same dividend as last time, a larger sum than this would be required. Although they had not quite earned it, the Directors proposed to pay the same dividend. The deficiency in the profits was accounted for by some excessive charges which would not occur again—such as the extra cost of pumping by temporary machinery at the new wells during the drought. The Directors proposed to take £1100 from the undivided profits; and this would make up the amount required for the dividends. Regarding the water undertaking, he was happy to say that, during the severe drought of last year, they were enabled to supply the district perfectly, and only had to cease the road watering for two or three weeks. The new engines for the pumps at the East Barnet works were in hand; and the Engineer hoped to have them running this season. When they had them in operation, the pumping account would be brought down to its normal limits. Of course, the item for pumping on this occasion was higher than it should be, because they had not had proper and economical machinery to use; but the new engines would be the most economical now made in regard to fuel consumption. The £1100 which they were short of was accounted for by the extra cost of pumping during the half year. In order to keep the district well supplied, they made use of the contractors' pumps at the new wells from time to time. But the use of these would cease when they got their own engines to work; and the extra cost would then be saved. Taking the two undertakings together, they made a larger profit than in the corresponding period of 1898; so that altogether the report was not a bad one. He concluded by formally moving the adoption of the report and accounts.

Mr. A. H. BAYNES seconded the motion.

Mr. R. JOHNSON pointed out that the Chairman had not said much regarding the work which was being carried out at Potters Bar, but he confined his remarks more directly to the work at East Barnet, which he presumed was a little more successful. According to the water capital account, they did not appear to have expended anything during the past half year. The item to which he referred was rather mixed up. It comprised reservoirs, premises, wells, shafts, conduit pipes, and works for the collection and impounding and storage of water. In 1897, £19,000 was spent in connection with those works; bringing up the total to £48,316. But nothing was shown as having been expended during the past half year; and he should like to know how the outlay at Potters Bar had been charged.

The CHAIRMAN replied that the work had not been charged to capital account yet, as it was not finished. The amount expended on works and not yet charged was £27,595. Asked also as to whether he expected the Potters Bar well would be a success, the Chairman answered that they did anticipate a sufficient supply of water to justify them in putting down permanent pumps.

The resolution was unanimously carried.

Dividends were next declared at the rates of 9 per cent. per annum on the "A" and "C" stocks, 8 per cent. on the "B" stock, and £6 6s. per cent. on the "D" capital gas and water stocks and shares.

The retiring Directors (Mr. James Glaisher and Mr. Alfred Lass) were both unanimously re-elected; reference being made to the assiduous manner in which both gentlemen had worked to bring the Company to its present prosperous condition.

The retiring Auditor (Mr. Frederick Lennard) was also re-appointed, on the proposition of Mr. J. L. CHAPMAN.

On the motion of the CHAIRMAN, seconded by Mr. JOHNSON, the remuneration of the Secretary was fixed at £250 per annum.

The CHAIRMAN next proposed "that the 3792 fully paid-up shares of £10 each, forming part of the additional capital authorized to be raised by the Company's Act of 1883, be converted or consolidated into 'D' capital water stock, such stock to be divided amongst the holders entitled to the said shares according to their respective interests therein."

Mr. DYER seconded the motion, which was unanimously carried.

The thanks of the shareholders were heartily accorded to the Chairman and Directors and the officials.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

When moving the adoption of the report of the Directors of the Aldershot Gas and Water Company (*ante*, p. 347), at the recent half-yearly meeting, the Chairman (Mr. A. F. Wilson) remarked that, like the generals in South Africa, the Company had had to retrace their steps, and increase the price of gas to 2s. 9d. per 1000 cubic feet. He explained that this was due to the coal market, which had become so uncertain that they had to make up their minds to the probability of an increased expenditure of from £2000 to £3000 in the next half year. If during the past six months the price of gas had been 2s. 9d., as it would now be, they would have been £750 more in pocket. Now this would go as a set-off to the extra cost of coal. At the same time there had been a large profit from the fitting and plumbing business, for which the Secretary and the Manager must be credited. From about £50 in the half year the profit had risen to £241. The report was adopted, and the dividends recommended were declared.

The annual meeting of the shareholders of the Barnsley Gas Company was held yesterday week. The report (which was read by the Secretary and Manager, Mr. W. W. Hutchinson) recorded a total revenue of £28,417, against £26,414; the gross profit being £8429, or an increase of £239. In referring to the eminently satisfactory condition of the accounts, the Chairman (Mr. E. G. Lancaster) stated that last year it cost, broadly speaking, £19,910 to make 150 million cubic feet of gas, against £18,233 for 143 million cubic feet the previous year—the increased cost of coal (£1400) about making the difference. The cost averaged about £133 per million cubic feet last year, against £127 in the preceding year. The residual products, however, had given them about £1000 increase. Putting the matter in another way, the gross profit of the concern was £10,274, out of which they had returned to consumers £1845, or equal to 18 per cent. of the profits. With regard to the future, he must admit the Board looked forward with some degree of anxiety. They had two very important questions—the electric light and the price of coal. They carbonized 17,000 tons of coal per year; and if the increased price was only 2s. per ton, it represented £1700. But they were afraid the increase would mean £3000 or £4000. They did not intend to raise the price of gas if they could possibly help it; but the consumers might have to temporarily dispense with the discount, and the further loss would have to be borne by the shareholders. This arrangement, he thought, would be admitted to be reasonable. With regard to the electric light, it was now actually in use; and the shareholders would naturally want to know what effect it had had upon the consumption of gas. They would hardly credit it, but, since the installation had been at work, there had been a larger consumption of gas than had ever been experienced in the life of the Company. The report was adopted; and the maximum dividend declared. A vote of thanks was accorded to the Chairman, Directors, and Manager.

The recent annual meeting of the Barnstaple Gas Company was characterized by a somewhat acrimonious criticism on the part of one or two shareholders. In moving the adoption of the report and accounts, the Chairman (Mr. W. C. Rafarel) remarked that the inflated price of coal and the difficulty of getting delivery had caused the Directors anxiety. They had, however, managed to obtain sufficient coal to carry them on without restricting the supply of gas. The receipts for the year showed an improvement of £530 on residuals account; but, on the other hand, the payments were £975 in excess of those in 1898, partly owing to an over-estimate of the stock of coal and to the stock having been taken in 1897 at less than its full cost. The profit carried to the net revenue account was £1607; and the balance available for distribution was £1700. The gas made last year showed an increase of 1,268,300 cubic feet. The number of consumers was 1042. Since the last meeting, the Corporation had taken over the lighting of the public lamps. Mr. S. Berry, in seconding the motion, said that, notwithstanding the various difficulties which they had to contend with, the undertaking was in a satisfactory condition. Mr. F. W. Petter asked what were the difficulties which the Company had had to surmount. The Chairman said there were always difficulties in carrying on an extensive and complicated business. Mr. Petter asked a question as to the number of public lamps, and alleged that no record of the number was kept in the office. The Secretary (Mr. F. L. Schofield) said there were 292 public lamps, of which one was double and 23 were treble. In the course of further discussion, Mr. S. N. Petter remarked that they were £97 worse off than they were last year, and yet it was thought they had managed splendidly. Mr. H. Ashton complained of the tone of the discussion, and suggested that Mr. Petter should sell his holding. The report was

unanimously adopted; and the usual dividends of 10 and 7 per cent. were declared.

The annual report of the Cheltenham Gas Company shows that sufficient profit has been made to pay the statutory dividends, and leave a balance to the good of £500; the actual profit being £14,085. The consumption of gas was not only greater by 16 million cubic feet, but the largest in one year ever known. Despite this, the profit is nearly £200 less; and the explanation lies in the higher price of coal. The receipts from residual products increased from £11,200 in 1898 to £15,000 last year; the chief gain being for coke. The Directors record that a recent sale of £5000 of ordinary stock realized a premium of £1380 10s.

The revenue of the Colney Hatch Gas Company from the sale of gas in the half year ending Dec. 31 was £6779; being £6290 for 33,776,800 cubic feet used by private consumers, and £489 for 2,626,300 cubic feet used for public lighting. The sale of residuals produced £1593; and the total receipts were £9087. The expenditure being £6686, the balance carried to the profit and loss account was £2401. The amount available for distribution was £5012; and the Directors recommended dividends at the rate of 10 per cent. per annum upon the original shares, 7 per cent. per annum on the additional shares and stock, and 5 per cent. per annum upon the preference shares. The payment of these dividends will absorb £1868, and leave £3144 to be carried forward. The Directors reported continued growth of the Company's business. The quantity of gas sold was 9 per cent. more than in the half year ended Dec. 31, 1898; and a further increase also took place in the value of residuals. But against these improvements had to be set the higher cost of coal, wages, and material; and it was expected that a still larger advance in the cost of coal would probably have to be met during the present year. Additional manufacturing plant is in process of erection, and further additions will have to be made from time to time in the near future, to enable the Company to meet the constantly growing demand for gas.

In the report of the Eckington and Mosbro' Gas Company, it is stated that, owing to the increase in the price of coal and the installation of the electric light at the Holbrook Colliery, the price of gas has been raised from 3s. 4d. to 3s. 9d. per 1000 cubic feet. From the balance standing to the credit of profit and loss account, the Directors are able to declare a dividend of 7 per cent.

The half-yearly general meeting of the Farnworth and Kearsley Gas Company was held last Thursday—Mr. J. W. Watkinson, the Chairman, presiding. The Directors in their report stated that the profit on the revenue account amounted to £3019, and that a sum of £5333 was available for distribution. They recommended the payment of dividends at the rate of 10 per cent. per annum on the "A" stock and 7 per cent. per annum on the "B" stock and on the "D" shares (all less income-tax). In moving the adoption of the report, the Chairman said he was pleased once again to refer to the satisfactory condition of the Company. During the past half year, there had been a material increase in the quantity of gas sold, and also an improvement in the revenue derived from the sale of residuals. He was proud to state that the increased cost of coal and cannel, and the recent reduction in the price of gas, had not to any great extent affected the working results. Mr. J. Holland Watson, in seconding the motion, supplemented the remarks of the Chairman by referring to the accounts and the healthy financial condition of the Company. The report was adopted, and the dividends recommended were declared. Mr. W. Watson moved, and Dr. Walter Morris seconded, a hearty vote of thanks to the Directors and officers of the Company; and the motion was carried by acclamation. The Vice-Chairman (Mr. J. Fletcher) and the Manager (Mr. T. L. Sheppard) returned thanks; and the proceedings terminated.

Addressing the shareholders at the annual meeting of the Ipswich Gas Company on Monday last week, the Chairman (Mr. G. A. Biddell) alluded to the state of the coal market. So far as the Company were concerned, he remarked that their contracts had still a few months to run; and unless prices were very much increased, they hoped to get through without raising the price of gas. A shilling per ton increase in the cost of coal represented £1500 a year to the Company; but they were never in so good a position to meet a reasonable advance as they were this year. Referring to the capital account, he said that, notwithstanding the heavy expenditure, chiefly for new purifiers, the proportion of capital to coals carbonized had been reduced to the lowest figure it had ever been at—viz., £4 16s. 4d. per ton. Then, besides renewing half-a-mile of main, three miles of new mains had been laid; and arrangements had been made to at once put down some new arterial mains at considerable cost. There were now over 50 miles of mains, bringing in a revenue of nearly £800 per mile, with an average of 145 consumers per mile, out of a total of 7235 consumers; besides 1358 public burners. The quantity of coal carbonized during the year was 29,537 tons, which was 3585 tons more than in 1898. The increase in the make of gas had been 10·2 per cent., as against 5·88 per cent. in 1898. They had sold 277 million cubic feet; being an increase of 24¼ millions. Thirteen years ago, the consumption was just half this quantity. The receipts for gas were £40,284—an increase of £3162. About one-fifth of this total (£8252) was from slot meters. There were now 4000 of these popular instruments fixed—an increase of 583; while 140 more were on order at the end of the year. Residuals had produced £13,650—an increase of £3212. Coke brought in £10,034, rather more than half the cost of coals. The total revenue was £54,064, as against £47,673 in the previous year. He also directed attention to the expenditure of £7259 for repairs and maintenance; remarking that he liked big figures under this head, as they showed that the works were maintained in a state of good repair. The outcome of the year's earnings enabled the Directors to pay the full dividends on all stocks, and to carry forward £7079. He added that there were in Ipswich about 2150 domestic gas-fires, 680 cookers were used by ordinary consumers, and 600 were attached to slot meters. There were also upwards of 100 gas-engines fixed; being 14 more than last year. Mr. D. Ford Goddard, M.P., in seconding the motion for the adoption of the report and accounts (which were noticed last week), pointed out that the eleven largest gas companies whose accounts were available realized 90·74 per cent. of the gas made in 1898; while in Ipswich they realized 93 per cent. This, he thought, was evidence that great attention had been paid to this part of the business by their Engineer and Secretary (Mr. J. T. Jolliffe) and the Directors; and there were other features which served to illustrate the great care bestowed upon all the details of the work. The balance-sheet was so satisfactory that it would defy any serious criticism. It all came to this—and they, as Directors, gladly acknowledged it—that the Company had a Manager and staff who took the greatest possible pains to make the undertaking successful in every branch of its operations. The motion was carried unanimously. Dividends were declared at the rate of 12 per cent. per annum on the "A" stock, 9½ per cent. on the "B" stock, and 9 per cent. on the "C" stock.

The annual general meeting of the Leighton Buzzard Gas Company was held on Monday last week—Mr. R. Richmond presiding. The accounts presented showed a profit of £1396 for the past year; and the addition of the balance of £223 brought forward made a total of £1619 standing to the credit of the profit and loss account. Out of this sum, the Directors recommended the declaration of dividends at the rate of 8 per cent. per annum on the original stock, and £5 12s. on the new ordinary stock, free of income-tax. The payment of these dividends will absorb £1206, and leave a balance of £413 to be carried forward. Reference was made to the loss by death of the former Chairman (Mr. F. Bassett) and two other Directors (Dr. Lawford and Mr. W. S. Page). The Chairman, in moving the adoption of the report, said he had to record the death of three Directors within the year, which he hoped he should never have to do again. The loss of these gentlemen was a serious blow to so small a Company. The accounts showed that the concern had had a successful year, notwithstanding the adverse circumstances they had had to contend with; and there had been an increase in the consumption of gas. Of course, the expenses had been greater. Residuals, however, were satisfactory, and they had no law charges this year. From a shareholders' point of view, they might pay another ½ per cent.; but this would be unwise without some prospect of maintaining it. Mr. Willis seconded the motion; and it was carried. Subsequently, the Directors were authorized to issue an additional £2000 of new ordinary 7 per cent. stock, under the provisions of the Company's Act of 1891. The Chairman explained that their Manager (Mr. C. F. Ruggles) had been anxious about the working; and he did not feel justified in going through another year without more retorts. To provide these they required money; and they had already overdrawn their capital account. A vote of thanks having been accorded to the Chairman, Mr. Richmond, in replying, proposed a similar vote to the Manager and the staff for the way in which they had carried on their work. This having been passed, Mr. Ruggles, in acknowledging it, spoke of the pleasure it gave him to act under such Directors as those of the Company, and said he was proud to know that they had what were recognized in the gas world as works which were among the best in the country.

The total receipts of the Littleborough Gas Company in the six months ending Dec. 31 amounted to £4660; the expenditure, to £2980. The profits were £1680, against £1544 in the corresponding period of 1898. The amount available for distribution was £2789, including the balance brought forward; and the dividends absorbed £1450. The reserve fund now stands at £3000.

The annual accounts of the Matlock and District Gas Company show a profit amounting to £2772, which, with the unappropriated balance, gives an available sum of £3564. From this an interim dividend has been paid; and the Directors now propose the payment of the statutory dividends of 5 and 3½ per cent. on the respective stocks and shares for the past half year. This will leave £1419 to be carried forward. Notwithstanding the rise in the price of materials and the increase in wages, the Directors made a reduction in the price of gas of 2d. per 1000 cubic feet from Jan. 1 last.

The half-yearly report of the Mirfield Gas Company states that the profit for the past six months amounts to £3158; making the sum available for dividend £4234. The Directors recommend the usual dividend of 10 per cent. on the old shares, and 7 per cent. on the new shares, and that the balance of £1734 be carried forward.

Presiding at the annual meeting of the Newcastle and Gateshead Gas Company last Wednesday, the Chairman (Mr. L. W. Adamson) moved the adoption of the report and accounts, which were noticed in last week's issue. He said for the year 1898 the balance of undivided profits was £3579; this year £3406 was carried forward to next year's account. For 1898 the profits were £70,227, and for last year £80,616. The gross amount available for dividend for 1898 was £73,309, and now £84,195. Out of this, the Directors recommended a dividend at the rate of 5 per cent. per annum on the preference stock, 9¼ per cent. on the ordinary stock, and the appropriation of £8000 to the reserve fund. It was necessary to transfer this sum to reserve, in order to meet the increased cost of material, which was almost certain to rise, and to prepare for very large extensions of mains. The Directors were fortunate in making their contracts for coal during the past year. In June, they thought they were paying rather a high rate for coal; but if they had had to buy it in the market in December, it would have cost them considerably more. The contracts which they were fortunate enough to enter into enabled the Company to meet their obligations to the public without having to increase the price of gas. The profits derived from residuals had improved; and the quantity of gas delivered had increased. The lighting of the city had never been so good as it was now; and all the experiments in lamps and lights had been carried out at the expense of the Company. When the new works were completed, their facilities for producing cheap gas would be greater. It was quite true they had complaints; but everybody in business had them. The Company had used every exertion to remove all cause of complaint, and had paid no regard to expense in doing so. The motion was adopted; and it was also decided to make a grant of £250 out of the net profits to the Queen's Commemoration New Infirmary Fund.

At the recent annual general meeting of the Newmarket Gas Company, the accounts presented showed that the revenue from the sale of gas to private consumers in the year ending Dec. 31 amounted to £8020, and that the total receipts were £12,429. The expenditure having been £8912, there was a balance of £3517 to go to the profit and loss account, the sum standing to the credit of which was £4349. The Directors, in their report, recommended that out of this sum a dividend at the rate of 6½ per cent. per annum should be paid (less income-tax), amounting to £3770, and leaving a balance of £579 to be carried forward. Under the supervision of the Manager and Secretary (Mr. J. H. Troughton), the works and plant have been increased and improved, a sum of £1387 having been expended on capital account during the year—£357 for new lamps and fittings, £334 for new sulphate plant, and £381 for a new

washer-scrubber. In moving the adoption of the report, the Chairman (Mr. R. Stephenson) said the past year had been a rather trying one, because for the first time they had had the competition of the Electric Light Company. While coal had cost £587 more than in 1898, the amount received from the sale of gas was £92 less. With regard to residuals, however, they had done well, in consequence of the new sulphate plant, which had cost £334 and had realized a gain of £145. As to the competition of the electric light, they had taken £198 less, from 59 customers, in the past half year than they would have done had there been no Electric Light Company in Newmarket; and, of course, they could not say that they might not lose a few more. If the other side would only state what those 59 customers had paid for electric light during that period, it would be most interesting information for the public of Newmarket, as they would then be able to judge whether, in fact, the Gas Company were supplying light cheaper or dearer than their opponents. Of course, the only real way to ascertain exactly what one system of lighting cost as compared with the other, would be to have two rooms of precisely the same size equally lighted, one with gas and the other with electricity, and have a meter on each room. If this were done, he would undertake to say that it would be found that the Gas Company could give as much light for 1s. 6d. as the Electric Light Company could for £1. He would almost throw out a challenge to that Company, if they would accept it, to have two rooms lighted in the manner he had suggested; but he did not think it at all likely that it would be accepted, for the Engineers advising the Company knew very well the comparative cost of the two lights, and a challenge of that kind had never yet been taken up. In the matter of the public lighting, the two Companies tendered against each other; and the result was that the Gas Company showed that they could supply five or six times more light for a given sum of money than their competitors. With regard to other matters, he was afraid that next year there would be a further rise in the price of coal; but while he looked forward to this, he thought there would also be an increase in the quantity of gas sold. He took a very cheerful view of the position of the Company, and thought it would be quite as flourishing in the future as it had been in the past. Mr. Musk having seconded the motion, Mr. Rodrigo put some questions in regard to the Company's coal contracts, which were answered by the Chairman and Mr. Troughton; and the report and accounts were then unanimously adopted. It was subsequently decided to increase the remuneration of the Directors by 25 per cent.

The ordinary half-yearly meeting of the Portsea Island Gas Company took place last Saturday—Alderman Sir John Baker, M.P., in the chair. The accounts for the six months ending Dec. 31 last showed an available balance of £35,138, exclusive of the sum standing to the credit of the extraordinary renewals account (£3177), which enabled the Directors to recommend the payment of dividends at the rates of 13 per cent. per annum on the "A" and "B" shares, 12 per cent. per annum on the "C" shares, and 5 per cent. per annum on the stock, less income-tax, and left a balance of £22,946. The Directors reported that during the past half year 40,809 tons of coal had been carbonized, as compared with 38,672 tons in the corresponding period of the previous year; and 423,688,000 cubic feet of gas were manufactured (23,158,000 cubic feet in excess of the corresponding period), of which 390,965,200 cubic feet were sold. The residual products sold included 30,025 chaldrons of coke, 2339 chaldrons of breeze, 426,255 gallons of tar, and 692,428 gallons of ammoniacal liquor. The Chairman, in moving the adoption of the report, said the Directors had the keenest pleasure in again meeting the shareholders, owing to the very great success which still attended the undertaking. In order to strengthen and improve their position, their engineers had made great progress with the water-gas plant; and notwithstanding all the threats which had been made to them upon the subject of the introduction of electricity, they still found that they had an increasing revenue, while from the automatic prepayment meters there were receipts amounting to £400 per week. It was very satisfactory, too, that, in consequence of the contract they had made, they had avoided the "coal ring," and were still obtaining their coal at 10s. 11d. per ton. This, they trusted, would continue until the present very heavy extra prices were lowered. The Vice-Chairman (Alderman Sir W. D. King), in seconding the motion, said there was one item which the Chairman had not touched upon, and that was the large returns from the residuals. On the coke alone there was an extra revenue of about £4000 on the half year. The motion was carried unanimously; and the payment of the dividends recommended was authorized.

The half-yearly general meeting of the Reading Gas Company was held last Tuesday, when the Directors reported a continuous and considerable increase in the quantity of gas sold in the six months ending Dec. 31, together with a revenue from residuals largely in excess of that for the corresponding portion of 1898. The prevailing high price of coal added materially to the cost of gas manufacture in the period covered by the report; while its irregular delivery, especially about Christmas time, caused the Directors great anxiety. As, however, some improvement has already taken place, they hope to successfully cope with the difficulty. The accounts accompanying the report showed that the sale of gas for public and private lighting (10,937,000 and 169,695,500 cubic feet respectively) produced £25,123; the revenue from residuals was £9102; and the total receipts were £34,272. The expenditure on the manufacture of gas came to £23,078 (coals costing £16,927); on distribution, to £2374; and on management, to £1514—the total being £29,302. The balance carried to the profit and loss account was £4970; and the amount available for distribution was £19,057. The Directors recommended the payment of the full dividends for the half year on all the stocks and shares of the Company. Under the supervision of Mr. Herbert E. S. Baker, the Company's Engineer, 18,113 tons 13 cwt. of coals were carbonized; the residual products being: Coke 18,113 chaldrons, breeze 214 loads, and tar 183,626 gallons. There were 180 tons of sulphate of ammonia made during the half year, all of which was sold.

The annual general meeting of the Redhill Gas Company was held on the 15th inst.—Mr. H. Stenning in the chair. The Directors reported that the consumption of gas in the past twelve months showed a marked increase on previous years; and owing to the extra demand, it had been found necessary to extend the works. The new plant was in course of erection. The accounts showed that a sum of £5329 was available for distribution, out of which the Directors recommended the declaration of a dividend at the rate of 9½ per cent. per annum, less income-tax; leaving a balance of £279 to be carried forward. An interim dividend of 4½ per cent. was paid in September. The Directors referred with regret to the resignation, followed shortly afterwards by the death, of the late Chairman, Mr. John Lees. In moving the adoption of the report, the Chairman stated that the business of the Company had been highly satisfactory, for there had been an average increase of 12 per cent. over 1898. Their prepayment meters, of which they had 800 out, accounted for a certain proportion of this. Further enlargement of the works was absolutely necessary. They must have another holder and additional plant to keep pace with the growing demand for gas. With the object of obtaining more land for extensions, a Bill had been promoted which they hoped would be carried through satisfactorily. A good deal of credit was due to the Engineer (Mr. D. H. Helps), who had served them well. Mr. Hunt seconded the motion, which was carried; and the dividend recommended was declared.

The half-yearly general meeting of the Riddings District Gas Company was held last Friday, when the accounts presented showed that the revenue from the sale of gas in the six months ending Dec. 31 last was £1925, and that the total receipts were £2290. The expenditure being £1483, the balance carried to the profit and loss account was £807. The amount available for distribution was £2420; and the Directors recommended the declaration of a dividend at the rate of 6 per cent. per annum, free of income-tax.

At the meeting of the Rugby Gas Company yesterday, the Directors expressed their pleasure at again being in a position to report that the affairs of the Company are in a satisfactory condition and the works (under Mr. Charles Meiklejohn's supervision) in a high state of efficiency. The accounts for the past year showed that the sale of 64,672,800 cubic feet of gas in Rugby itself produced a revenue of £8249; the quantity sold in the out-districts (1,018,500 cubic feet) yielding £155, and that used for public lighting £3143—making a total of £11,547. Residuals returned £3378; and the total receipts were £15,839. The manufacture of gas cost £8500 (of which £5503 was for coals); distribution, £467; and management, £1097—the total expenses being £10,771. The balance carried to the profit and loss account was £5068; and the amount available for distribution, £6455. The Directors recommended the declaration of a dividend at the rate of 12½ per cent. per annum, amounting to £2178, free of income-tax; making, with the interim dividend, 12½ per cent. for the year. The working statements in the accounts showed that the bulk of coal and cannel carbonized last year weighed 8662 tons; the estimated quantities of residuals produced being: Coke, 5197 tons 15 cwt.; lime refuse, 192 tons; breeze, 216 tons 11 cwt.; tar, 504 tons; ammoniacal liquor, 969 tons.

At the half-yearly general meeting of the Scarborough Gas Company on the 17th inst., the Chairman (Mr. B. Fowler), in moving the adoption of the report, noticed in the "JOURNAL" a fortnight ago, stated that the total quantity of gas sold in the six months ending Dec. 31 was 149,524,300 cubic feet—being an increase of nearly 6 millions, or slightly over 4 per cent., as compared with the corresponding period of 1898. The number of consumers had augmented by 329 during the twelve months; and there had been an addition of 71 cooking-stoves. The gross receipts were £25,420—being an increase of £1315; and the payments were £17,121, or £1328 more than in the corresponding half year. The extra expenditure was mainly due to the increased cost of coals—2s. per ton. Had the Company not been fortunate enough to possess a two years' coal contract, he did not know what they would have done. The balance carried to the profit and loss account was £8298, as compared with £8310; and the amount carried forward, after payment of the dividends, was £1665, as compared with £2110—a decrease of £445, which was accounted for by the increased amount required for the half year's dividend consequent on the increased capital. Mr. Butterfield seconded the motion. Mr. Whitfield pointed out that the Company were using 500 gallons of oil per day in the manufacture of water gas; and he remarked that, in the event of a coal famine, this would be a new power in their hands. The Chairman, in reply, agreed that it certainly would. He added that recently they had been very near the end of their coal, and if it had not been for water gas, things might have been serious. When they started making water gas, the cost of the oil was 3d. per gallon, and now it was 7d. Fortunately, the Company had a contract at the lower figure, which had not run out. In the course of the proceedings, several references were made to the ability displayed by Mr. Holliday, the Company's Engineer and Secretary, in carrying on the works, upon which the Chairman said a great deal had lately been spent—he believed wisely. The report was adopted, and the maximum dividends were declared.

At the annual general meeting of the South Shields Gas Company to-morrow, the Directors will present accounts which show that the sale of gas for public and private lighting last year brought in a revenue of £54,473; residuals producing £13,364, and the total receipts being £72,372. The expenditure on the manufacture of gas amounted to £46,260 (coals costing £27,613); on distribution, to £2324; and on management, to £2520—the total expenses being £56,420. The balance carried to the profit and loss account is £15,952; and the amount available for distribution is £6440. As the statutory dividend for the latter half of the year comes to £7817, there is a deficit of £1377, which it is proposed to take from the reserve fund. The dividend will be 4½ per cent., which, with the interim dividend, will make 8¾ per cent. for the year. In their report, the Directors state that the sale of gas last year exceeded by 15,547,015 cubic feet that of 1898, or at the rate of 3½ per cent.; and there was a net increase of £4727 in the rental. On the other hand, coals cost £5393, or 24¼ per cent. more; and there was an increase in the wages account of £1356, or upwards of 7½ per cent. Under the supervision of Mr. W. J. Warner, the Company's Engineer and Manager, 50,455 tons of coal and 2093 tons of cannel were carbonized last year; and of the total bulk of gas made, 392,730,100 cubic feet were sold for private consumption. The quantities of residual products were: Coke, 33,076 tons; tar, 519,695 gallons; and ammoniacal liquor, 525,280 gallons, which was used in the manufacture of sulphate of ammonia.

The half-yearly meeting of the Wakefield Gas Company was held on Monday last week, under the presidency of Mr. W. A. Statter, J.P., the Chairman. The notice convening the meeting having been read by the Secretary (Mr. W. H. Parker), the Chairman went through the various

items of the accounts (briefly referred to last week), and stated that the half year had been very satisfactory; the profit being £469 more than was required to pay the usual dividends, while the increased make of gas amounted to 7,199,000 cubic feet. They had, however, very great difficulty in getting coal, and this, added to the demand for gas, had made the period covered by the report a very anxious time. During the half year, some remarks had been made with reference to the quality of the gas. The shareholders would therefore be pleased to learn that in the years 1894-6, when Mr. T. Fairley tested the gas, the average of 34 tests showed that the quality equalled 16·75 candles, or 1·75 candles more than the parliamentary standard; while the average of 62 tests in the years 1896-9, made by Dr. Chaplin, showed 16·28 candles, or an excess of 1·28 candles beyond the standard. There had been 60 tests in the past three years, showing an average of 15·8 grains of sulphur—a result which would compare favourably with that of any other gas undertaking, although the Company had no parliamentary limit for sulphur compounds. As to the pressure, the Examiners reported an average of 2·75 inches when the pressure required by the Act was 8-10ths of an inch, or 343 per cent. above the parliamentary standard. These tests were all taken at the Town Hall, by the Gas Examiners appointed by the Corporation, at times quite unknown to the Company; and during the whole of the period from 1894 to 1899, no legal test was found below the standard. The new works were proceeding satisfactorily, notwithstanding the fact that the contractor had been delayed in putting the roof on the new retort-house owing to the difficulty in getting iron. Mr. Statter concluded by moving the adoption of the report and accounts. The motion was seconded by the Vice-Chairman (Mr. G. H. Roberts), and carried. The payment of the usual dividends at the rates of 11½, 9, and 8½ per cent. per annum on the various classes of shares, clear of income-tax, was then authorized. The best thanks of the meeting were next unanimously accorded to the Chairman for presiding, and to the Directors for their attention to the interests of the Company. In responding, the Chairman proposed in generous terms the usual vote of thanks to the staff, which was acknowledged by the Engineer (Mr. H. Townsend) and the Secretary.

The half-yearly general meeting of the Weymouth Consumers' Gas Company was held last Thursday, when the Directors congratulated the proprietors on the fact that the profit made in the six months ending Dec. 31 was sufficient to meet the fixed charges on the loan capital, pay the maximum dividend upon the ordinary stock, and carry forward £111. The disturbed state of the coal market caused the Directors considerable anxiety, and great difficulty was experienced in obtaining sufficient coal to keep up a full supply of gas. This object was only achieved by buying in districts other than that from which the Directors usually get their supplies, and at enhanced prices. There was, however, a good market for coke; and in this way the increased cost of coal was met. The accounts presented showed that for public and private lighting 36,738,000 cubic feet of gas were sold, realizing £7054; residuals produced £1395; and the total receipts were £8727. The manufacture of gas involved an expenditure of £5136 (coals costing £3342); and the total expenses were £6367. The balance carried to the profit and loss account was £2360; and the amount available for distribution, £4135. The Directors recommended the payment of a dividend at the rate of 5 per cent. per annum, less income-tax. Under the supervision of the Manager and Secretary (Mr. James Lowe) a portion of the works is being reconstructed. A vote of thanks was accorded to the Chairman, Directors, and Manager.

Water Companies.

At the meeting of the East Worcestershire Water Company on Thursday, the report which was noticed on the 13th inst. was adopted. The Directors were authorized at a subsequent extraordinary meeting to issue 3 per cent. debenture stock to the amount of £7000, and 617 new £10 shares at a premium of £2 10s. The money is required for extra works which are being carried out.

Proposing the adoption of the report and accounts of the Sunderland and South Shields Water Company at the annual general meeting held last Thursday, the Chairman (Mr. James Stokoe) stated that during the past year they had expended on various works £46,303; making the total expenditure on capital account £811,010. The balance to profit and loss account was £37,048, against £38,638 in the previous year. This decrease could be accounted for by the fact that there had been a good deal more rain last year than in the previous one; and consequently there had not been the same draft upon the Company. The balance-sheet showed £10,664 due to bankers, against £17,611 in 1898. The report was unanimously adopted; and dividends at the rates of 4½, £3 3s., and £2 5s. per cent. on the various classes of stock were declared.

Mr. F. James presided at the meeting of the South Staffordshire Water Company last Thursday; and in moving the adoption of the report (*ante*, p. 415), commented upon the considerable increases in expenditure during the past half year. Engine charges, he said, had gone up from £5085 in the corresponding period of 1898 to £7224; and he could hold out no hope that the item would be less rather than greater in the current half year. The cause of the increase in engine charges was that the cost of coal was greater; for, whereas in 1898 the average per ton was 5s. 5d., last year it was 6s. 7d. The contracts for coal did not run out till July this year. The increase in the amount of coal consumed was due to the greater quantity of water pumped; the total increase in the last half year amounting to 104½ million gallons. The cost of maintenance of works had gone up from £3616 to £6648. Of this large sum, £700 was spent in cleansing a reservoir; but this was not a recurring charge. There had been a satisfactory increase in the water-rates; and although in the half year the expenses had been so heavy, they had earned £1035 more than the sum required for the payment of the dividend. On capital account £14,381 had been expended, bringing the total expenditure on the works to £1,120,000. He recollected that, when they went to Parliament on the formation of the Company, it was anticipated that £200,000 would be the cost of supplying South Staffordshire with water. Now they had reached a sum of £1,120,000; and this was not to be the end of it. During the half year the Company had laid between 10 and 11 miles of mains, largely in old districts; and altogether they had between 600 and 700 miles of mains. The number of houses connected during the half year was 2483; making the total supplied 103,965. The report was adopted.

THE RECENT FLOOD AT GUILDFORD.

Interruption of the Lighting and Water Supply.

In the "JOURNAL" last week, we briefly recorded the interruption in the gas and electric light supply at Guildford in consequence of the flooding of the town on the night of Friday, the 16th inst. The water in the Wey was higher than it has been since 1824; and about half-past six on the evening of the above-named day, the mass of timber which had been brought down the river, and had accumulated against the arches of the town bridge caused the latter to collapse, and fracture the gas and water mains laid upon it. There was, at first, naturally a large escape of gas; but fortunately the ends dropped into the water, and sealed themselves, so that the loss and danger were lessened. On it being ascertained that there was not such an escape as was at first thought, and it being dark when the bridge broke away, nothing was done on Friday night. On Saturday morning, however, as soon as it was daylight, part of the *débris* was cleared away, and the ends of the mains bared, and plugged with clay. They were afterwards cut off on either side of the bridge, and blocked up. The 5-inch and 4-inch mains were then connected on one side of the bridge, and that district was thus afforded a partial supply of gas on Saturday and Sunday. At the gas-works, a stop was put for a time to the making of carburetted water gas. The water found its way to the plant, and rose as high as the blowers, which prevented their working. The fires of two of the boilers had to be drawn; but there was no interference with the manufacture of coal gas. The substantial walls round the works kept the water out to a great extent; and, moreover, there was a good stock of gas in the holders.

The water caused considerable interference with the working of the electric lighting plant. In one building there are three 40-horse power generating machines. Two of these were running on the morning of the 16th; but as the water continued to rise their working was stopped, and the water was so deep that the coils were just under it. In the building adjoining are two 100-horse power machines, which stand considerably higher than those above referred to; and on the former being stopped, one of the latter was set to work. The water, however, about half-past three in the afternoon, reached such a height that sufficient draught could not be obtained to keep up the steam; and accordingly the plant had to be shut down. As a result, there was no electric light in the town between Friday afternoon and Saturday morning, when a portion of the machinery was started again. Some of it was not able to run last Thursday morning; and it must therefore be a matter of time before the actual extent of the damage can be ascertained.

At the water-works, the water in the well was within 12 inches of the cover at ten o'clock on the morning of the 16th; and the engine-house was inundated to a depth of 2 feet. All the auxiliary power, both steam and gas, was thus cut off, and the pumps were useless. According to a statement made to a Press representative by the Borough Surveyor (Mr. C. G. Mason), this state of things must have commenced about 2 a.m. When the Water Engineer (Mr. H. Smith) visited the works at 6 a.m., there was a foot of water in them. The high-service reservoirs, which contain 600,000 gallons when full, were 1 ft. 9 in. down; and about 100,000 gallons had gone out since the pumps stopped. The low-service reservoirs were 5 ft. 6 in. down, and contained approximately 300,000 to 350,000 gallons. The flood occurred at a most inopportune time, as the mains had been subjected to a very severe strain by the late frost, and some very bad leaks existed; thus allowing the water to get away much quicker than it would have done under ordinary circumstances. Several of the staff were very busy for a long time securing the loose fittings which were floating about at the works. In the emergency, Mr. Mason consulted with the Town Clerk and the members of the Water Committee, and it was decided to seek the assistance of the Woking Water Company; and Mr. Quick, their Consulting Engineer, was at once communicated with by telegraph. The following morning he went to Guildford, and had an interview with the Water Committee; and, as the result, Mr. Mason was instructed to couple up the Woking mains wherever he could. Fortunately, when the Company some time ago apprehended trouble in regard to their supply, connections were made with their mains at two points. These, therefore, were available for the assistance of Guildford by simply reversing the meters. This work was completed on Saturday, and a small section of the town at once enjoyed the benefits of a full supply from the Company. By eight o'clock on Sunday evening, a 3-inch connection was effected which gave a supply to the low-level districts. This assistance came just in time, as the low-service reservoirs had become exhausted. As soon as the floods abated from the engine-house steam was got up, and subsequently a connection was also made with the new 8-inch rising main laid nearly two years ago. The power thus obtained was employed to drive the water-pressure engine over the well, and pumping was commenced in earnest at eleven o'clock on Sunday morning. The mains in the town were all shut off, and the large quantities of water in the well and the adjoining tank were dealt with. There were twelve hours' continuous pumping; and it was resumed on Monday morning—water of the finest quality being sent into the river before pumping into the reservoirs was started. At eleven o'clock on Monday morning, instructions were given to lift the water to the high and low service reservoirs; and by Monday night the water supply had assumed its normal conditions, with the exception that, instead of having full reservoirs, they were only half full. At a special meeting of the Town Council held on Tuesday evening to consider the damage done by the flood, the Chairman of the Water Committee (Alderman Salsbury) made a statement in regard to the difficulty experienced at the water-works, and said he thought the Council should recognize Mr. Quick's kindness in so promptly coming to their assistance. The Woking Company had agreed to supply them with water at 1s. per 1000 gallons and the cost of altering the meters; and he moved the approval of this arrangement. The Mayor (Mr. H. Peak) in seconding the motion, said the thanks of the Council were due to Mr. Quick for the kindly manner in which he came down and met the Committee; and, as the members would recollect, he was willing to do anything they asked him that would help them. He should like also to point out that their own officers had worked splendidly, and their men too. Wherever the members of the Committee went, they found their officers and men working and trying to help them in every possible way. The motion was carried *nem. con.*

GAS v. ELECTRICITY AT NEWMARKET.

Readers of the "JOURNAL" are aware that Mr. J. H. Troughton, the Manager and Secretary of the Newmarket Gas Company, has laid before his fellow-townsmen and gas consumers generally, in a little pamphlet he has written, a very convincing statement as to the relative economical value of gas and electricity as illuminants. He finds nevertheless that, at all events in the sphere in which he labours, statements are industriously circulated by persons interested in the electric light which have to be combated. He has therefore inserted in a local paper a conspicuous advertisement, the principal portions of which are brought into prominence by the use of heavy type, in which he once more demonstrates the real worth of gas. He shows that when used with the Kern burner its cost is only one-fifteenth that of the incandescent electric light; while with the older type of incandescent burner it is one-eighth, and with the old-fashioned flat-flame burners one-half. With the Kern burner, the Company are now supplying 100-candle power gaslight for less than is being charged for 8-candle power electric light. It is well to put this fact clearly before the consumers, as canvassers for the electric light, as is pretty well known, quietly ignore the new burners, and make their comparisons with practically obsolete types; moreover, they are careful never to allude to the liability of their illuminant to sudden extinction. A system of free wiring is being pushed in Newmarket; the rental for the fittings being a halfpenny in addition to the 7d. per unit charged for the current. But the Gas Company guarantee to give, by means of the Kern burner, as much light for the odd halfpenny as the users of electricity get for their 7½d. Surely, unless the inhabitants are particularly desirous of indulging in needless extravagance, they will give this fact careful consideration.

ELECTRIC LIGHTING NOTES.

The working of the Huddersfield Corporation electric lighting undertaking during the past year has resulted in a surplus balance of £2829; and this is to be transferred to depreciation and contingencies account to meet future expenditure. The Electric Lighting Committee are considering a proposal to lease the Provisional Order of the Mirfield District Council.

On the application of Mr. B. C. Roberts, the Chairman of the Lighting Committee, the Chester Town Council last Wednesday authorized an application to the Local Government Board for sanction to borrow a further sum of £35,000 to defray the cost and provide for the extension in connection with the Electric Lighting Department. Mr. Roberts stated that the new plant would cost above £11,000, and the buildings about £7200. The borrowing of £35,000 would possibly preclude the necessity of the Council applying to the Board for the next two years.

The Bath Corporation have not so far made a financial success of their electric light undertaking, and the Electric Lighting Committee have required £1937—nearly equivalent to a 2d. rate—to pay off the deficit which has accrued since the works were purchased three years ago. The accounts for 1899 show a gross profit, when working expenses only are considered, of £2165; but adding interest and repayment charges, and bringing forward last year's adverse balance of £125, this is converted into a deficit of £1937. It is generally conceded, however, that the light has not yet had a fair trial.

The Yeadon District Council, having considered the report of the expert engaged to advise them on the best methods of carrying out their Electric Lighting Order obtained in 1894, have decided to visit a number of places where the light is in operation, and have also instructed their Clerk to ascertain whether the Leeds Corporation, who have been asked to carry out the suggested scheme of tramways, would supply Yeadon with electricity for lighting purposes, either in bulk or per light. In his report, the expert (Mr. Enright, of London), propounds a scheme entailing a capital expenditure of £12,600 for 4500 8-candle power lights, with an estimated annual expenditure of £1540, and an estimated income of £2035.

Mr. R. H. Bicknell conducted a Local Government Board inquiry at Grimsby yesterday week in reference to an application by the Corporation for permission to borrow an additional £11,500 for electrical purposes. The Deputy Town Clerk (Dr. Grange) stated that there was a deficiency of £551 upon the original estimate, and £10,949 was required for further works. The original sum authorized to be borrowed was £43,500; and the total, with the amount now required, would be £55,000. The Borough Engineer (Mr. M. Petree) said the additional expenditure included an engine of 350-horse power, which, with boilers, dynamos, &c., would cost £6000, and £1677 was required for Consulting Electrical Engineers' charges.

Mr. H. Percy Boulnois sat at Bradford last Wednesday to consider an application by the City Council to the Local Government Board for authority to borrow £10,000 for electrical extensions. The Town Clerk (Mr. F. Stevens) stated that the money was needed for the erection of additional buildings and for the provision of more machinery and plant. There was an increasing demand for electricity for lighting and motive power; and the works also supplied the two new tramways by the overhead trolley system. The buildings in connection with the generating works were estimated to cost £4700, and the machinery and plant proposed to be laid down would require £5100. The City Treasurer (Mr. G. Thorpe) gave evidence to the effect that, since the undertaking was commenced, the profits had amounted to £23,606, and £10,556 12s. 3d. had been written off for depreciation. The Town Clerk added that there was a loss during the first two years; but the undertaking was now making large profits. Mr. A. H. Gibbings (the Electrical Engineer) also declared that the proposed extensions were absolutely necessary.

A report submitted to the Exeter Town Council last Wednesday stated, on the authority of the Electrical Engineer, that the general results of the working of the undertaking in 1899 were of a most satisfactory character. As compared with the previous year, the consumers increased from 300 to 353; the number of 8-candle lamps, from 14,500 to 18,000; and the number of units sold, from 200,000 to 285,000. This increased business had been done without any appreciable addition to the working expenses of 1898; while an extra revenue of more than £1000 had been earned. This excellent result, the Engineer (Mr. H. D. Munro) explained, was partly due to the improved character of the demand; nearly one-sixth of the consumers being in private houses. Congratulatory speeches were, of course, made on the progress of the undertaking; but the enthusiasm was a little damped by the complaint of one of the members of the irregularity of the light, which on more than one occasion had failed altogether. He objected to it being said that the undertaking was working satisfactorily. Alderman Domville, Chairman of the Electric Light Committee, apologized for the "occasional discomfort" experienced of late, and said he did not anticipate anything of the kind in future.

The dangers attending the supply of electricity were exemplified once more at an inquiry which was held last Friday, by Mr. E. N. Wood, Deputy-Coroner, at Greenwich, into the circumstances attending the death of Samuel Robert Harvard, 30, which resulted from an electric shock received through touching the spring of the switch-board at the central station of the Blackheath and District Electric Lighting Company in Blackheath Lane on the previous Wednesday morning. Mr. J. A. Constable, the Assistant Engineer, said the duty of the deceased was to regulate the voltage, and it was not his business to touch the metallic parts of the switches. In answer to the District Inspector of Factories, witness said the voltage on the machine by which the deceased was killed was 2750. Extra protection would have been secured if the floor had been insulated. Either an india-rubber mat or a dry wood covering would have served. The Jury returned a verdict of "Accidental death," and expressed the opinion that the floor should have been properly insulated. The Deputy-Coroner rendered this as "Accidental death, due to the absence of proper protection by the employers." The Company's Solicitor protested against this; but the Jury agreed with the wording of the verdict.

FALMOUTH WATER SUPPLY AND THE PUBLIC HEALTH.

In consequence of the prevalence of cases of enteric fever at Falmouth last year, Dr. G. S. Buchanan, one of the Medical Inspectors of the Local Government Board, was sent down to make inquiries into the sanitary condition of the town. Much of his attention was directed to the water supply, respecting which there has been, as readers of the "JOURNAL" know, a great deal of controversy in recent years. With reference to the streams flowing into the reservoirs, he indicates several potential sources of dangerous pollution, including manure deposits on the land near the streams, and drainage from scattered farm buildings and dwellings, as well as from three small hamlets in the gathering area. In order to properly safeguard the purity of the water, systematic inspection of the gathering-ground can hardly be dispensed with. No such inspection, however, is made by the officials of the Water Company. Dr. Buchanan considers the arrangements for filtering the water inadequate; and though he hesitates, on the results of several analyses, to condemn the water as impure, he points out that the proportion of nitrates indicated in one of the reports is suggestive of organic pollution. He is not satisfied that the fever cases were due to any specific contamination of the supply at its sources or on the gathering-ground. He inclines, however, to the belief that it was due to the local contamination of the supply through insuction of infectious matter into the pipes. Water-mains in Falmouth are, he says, from one or another cause, interfered with unusually often; mains and domestic supply-pipes are frequently placed in positions liable to injury; joints of supply-pipes are commonly unsatisfactory, and there are many "dead ends" which receive no attention. Taking into consideration these circumstances of the water service, and recalling the fact that during the months preceding the epidemic opportunities of local soil pollution were specially numerous in the high-level central area, it is, he thinks, permissible to surmise that the occurrence of insuction of infectious matters into the water-mains at some point or points in the high-level service shortly before and during the epidemic period would go far to explain the local incidence of the fever during that period. Concluding his report with a series of recommendations, Dr. Buchanan advises, as to the water supply, frequent and systematic inspection of the gathering-ground, with a view to preventing opportunities of pollution; construction of sand filters, which will secure an efficiency of filtration conforming to modern standards; providing for the maintenance of greater pressure on the high-level service; discontinuing intermission of the supply; and, above all, a thorough overhaul and cleansing of the whole system of water-mains in the town. Careful search for leaks in the course of the mains and at their terminations, and also in domestic supply-pipes, seems particularly needful.

THE SUPPLY OF WATER BY METER AT BRADFORD.

A Substantial Loss on Metered Supplies.

A point of some importance bearing upon the question of the price charged for water supplied by meter for trade purposes, was raised at the meeting of the Bradford City Council last Tuesday week. It was stated by the Chairman of the Water Committee (Alderman Holdsworth) that in the past year the total receipts for water sold by meter were £75,182. This was an increase of £5678 on the previous year, in addition to the consideration that £1180 would also have been received had not the out-districts been taken into the city on Nov. 9. Mr. E. R. Hartley pertinently inquired the cost per 1000 gallons of the water now brought into Bradford, and the total loss on water sold by meter at 6½d. per 1000 gallons. Alderman Holdsworth, in reply, said the daily consumption was between 12 million and 13 million gallons; and the cost per 1000 gallons, taking into calculation interest and sinking fund, was probably 8d. per 1000 gallons. He could not give the total loss on the sale of water at 6½d. per 1000 gallons. It was a variable quantity; and in the past year the drought was responsible for a larger quantity of water being taken than usual.

Commenting upon the matter, the "Bradford Observer" remarks: "The interests of Bradford are so largely bound up in the existence of a plentiful supply of cheap and good water for the industries of the city, that the question with respect to the sale of water by meter at less than cost price is not altogether one to be decided upon ordinary business principles. But it certainly seems to demand consideration whether in

the interest of the ratepayers the loss is altogether justified. Alderman Holdsworth told the Council that the water supply cost about 8d. per 1000 gallons, when interest and sinking fund had been charged for. Since in 1899 no less a quantity than 1500 million gallons of water were sold at 6½d. per 1000 gallons, the loss which has been incurred in the transaction exceeds £9000—a by no means inconsiderable sum. It must also be remembered that while, of course, the advantage is great that dyehouses and woolcombers should be kept at work, the demands made by some of these establishments are practically limited to times of drought, when other sources of water supply have failed. In the drought of last year, when the ordinary domestic consumption of water in the city was almost more than the water-works could supply, three firms alone, who usually supplied themselves from other sources, took by meter a daily supply of 3 million gallons from the water-works. If, as is to be presumed, this unusual and untimely demand was fulfilled at a daily loss of 1½d. per 1000 gallons, or a daily loss for these three firms alone of £375, while the regular users of Corporation water were put on the shortest possible rations, the transaction was a doubly unprofitable one. Certainly, while it may perhaps be a wise practice on the part of the Corporation to encourage the regular patronage of large firms who give employment to considerable bodies of workpeople, it is not fair that a few large establishments, who, as a rule, compete with the Corporation by supplying themselves, should be able when their own supply fails to take town's water at the reduced rate."

Ilkeston Water Supply.—A public meeting of ratepayers and inhabitants of Ilkeston was held in the Town Hall, on Friday, the 16th inst., for the purpose of considering the unsatisfactory condition of the water supply, and the immediate necessity of procuring unpolluted water. There is a good deal of typhoid fever in the town; and as Dr. Wheaton, an Inspector of the Local Government Board, Dr. Willis, the Medical Officer of Health for Ilkeston, and Dr. Klein all condemn the town water as unfit for a public supply, there is a strong feeling that the Town Council should cut off the Stanley Brook, which is the main source of contamination, at the earliest possible moment. The following resolution was submitted to the meeting, and carried unanimously: "That this meeting of ratepayers and inhabitants of the borough of Ilkeston, being satisfied that the present water supply, which has been condemned by an Inspector from the Local Government Board and the Medical Officer of Health, is grossly polluted, and unfit to be used, hereby urges upon the Town Council the imperative and urgent necessity of obtaining a sufficient supply of pure water; that it is of the first importance that an opinion by a leading professional expert should be immediately obtained, dealing with the whole question of the water supply; and that copies of this resolution be communicated to the Town Council and to the Local Government Board." In the course of the proceedings, a suggestion was made that a Ratepayers' Association should be formed for the following purposes: (1) To prosecute the Council for damages in every case of enteric fever; (2) to promote drastic measures to get matters attended to without delay, by refusing to pay the water-rate; and (3), if necessary, after giving the Town Council reasonable time, to appeal to the Local Government Board to turn the Council out of office.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The resignation of Mr. S. Stewart of the post of Gas Engineer to the Corporation of Greenock, referred to in the "JOURNAL" last week, was submitted to the Police Board on Tuesday. In his letter, Mr. Stewart stated that he had had the control of the works for 35 years, and that he considered it advisable, in the interests of the Board, that the management should be put into the hands of a younger man—more especially in view of the large extensions which are now necessary to meet the increased demand for gas, and the plans for which he had prepared, or was preparing. Mr. Mitchell, who is Convener of the Gas Trust, Provost Black, and other members of the Board, testified to the high quality of the services Mr. Stewart had rendered; and on the motion of Mr. Mitchell, his resignation was allowed to lie on the table. A Committee was appointed to consult with Mr. Stewart, with instructions that, in the event of his resignation being adhered to, they proceed to consider what arrangements should be come to for filling up the vacancy, as well as what retiring allowance should be made to Mr. Stewart, who, it is proposed, should be retained as Consulting Engineer. Everyone must admit that Mr. Stewart has chosen an opportune moment for retiring. He has reached the top of his profession; he has built up a most prosperous business; he has superintended the erection and equipment of a gas-works which are as up-to date as any; the town of Greenock is apparently emerging from under a cloud of depression which has hung over it since the sugar industry was swamped by foreign bounties; and it is quite appropriate that the gentleman who is to manage the extended gas-works should have the superintendence of their erection. I daresay it is out of respect for Mr. Stewart that the proposal is made that he should be retained as Consulting Engineer. It is out of no disrespect to Mr. Stewart that I would venture to suggest that the proposal should not go any farther. It appears to me that it is better, on all occasions, that when a man gives up the active control of an undertaking he should go outside of it altogether. It is better for himself, because he would otherwise have responsibility without power; it is better for the new man, because he would be free to carry out his own ideas; and it is better for the undertaking, because they would have only one man to deal with. A liberal retiring allowance will show the esteem in which Mr. Stewart is held, as well as anything.

In furtherance of the threat that the Town Council of Glasgow would be made to ring with the demands of the workmen for the recognition of their Unions until it should be granted, a communication from the Glasgow Trades Council was laid before the Town Council on Monday. This contained a resolution by the Trades Council expressing their regret that the Town Council had refused to grant the reasonable request of the employees of the Cleansing Department for an increase of wages, protesting against the language of some members of the Town Council when referring to the right of employees to submit complaints through the officials of their Unions, and urging the Town Council to give their employees full liberty to make their representations through their duly elected officials, thereby guaranteeing the employees against being interfered with because of their making personal complaints to

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 527.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 18	10½	Alliance & Dublin 10 p. c.	20½—21½	..	4 17 8
100,000	10	,,	7½	Do. 7 p. c.	14—15	..	5 0 0
800,000	100	Jan. 2	5	Australian 5 p. c. Deb.	100—102	..	4 18 0
200,000	5	Nov. 15	6	Bombay, Ltd.	5⅞—6⅛	..	4 8 11
40,000	5	,,	6	Do. New, £4 paid	4—4¼	..	5 6 8
880,000	Stk.	Feb. 23	12	Brentford Consolidated	267—272*	..	4 8 3
270,000	,,	,,	9	Do. New	203—208*	..	4 6 7
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145*	..	3 9 0
159,375	,,	Dec. 14	4	Do. 4 p. c. Deb.	118—123	−5	3 5 1
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig.	255—260	..	4 8 6
226,320	,,	,,	8½	Do. A. Ord. Stk.	185—190	..	4 9 6
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max.	125—130	..	3 16 11
420,000	20	Sept. 29	10	British	43—44	..	4 10 11
50,000	10	Feb. 23	12	Bromley, Ord. 10 p. c.	24—26*	..	4 12 4
75,000	10	,,	9	Do. 7 p. c.	19—21*	..	4 5 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9⅝—10¼	..	5 17 1
220,000	Stk.	Dec. 29	4	Do. 4 p. c. Deb.	98—100	..	4 0 0
150,000	20	July 13	8½	Cagliari, Ltd.	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13½—14½	..	5 10 4
50,000	50	Nov. 2	6	Do. 6 p. c. 1st Mort.	56—58	..	5 3 5
550,000	Stk.	Oct. 13	13½	Commercial Old Stock	305—310	..	4 7 1
200,750	,,	,,	10½	Do. New do.	240—245	..	4 5 9
200,750	,,	Dec. 14	4½	Do. 4½ p. c. Deb.	140—145	..	3 2 1
600,000	Stk.	Dec. 14	9	Continental Union, Ltd.	177—181	..	4 19 5
200,000	,,	,,	7	Do. 7 p. c. Pref.	178—183	..	3 16 6
51,600	Stk.	Aug. 31	14	Croydon A 10 p. c.	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p. c.	265—270	..	4 1 5
555,000	Stk.	Feb. 23	5½	Crystal Palace Ord. 5 p. c.	122—127*	..	4 2 8
60,000	,,	,,	5	Do. 5 p. c. Pref.	132—137*	..	3 13 0
486,090	10	Jan. 26	11	European, Ltd.	20½—21½	..	5 2 4
354,060	10	,,	11	Do. £7 10s. paid	15—16	..	5 3 2
14,993,075	Stk.	Feb. 9	4⅛	Gas-light and Coke	4 p. c. Ord.	105—107	..	4 13 5
2,600,000	,,	,,	3½		3½ p. c. max.	93—98	..	3 11 5
3,799,735	,,	,,	4		4 p. c. Con. Pref.	119—122	..	3 5 7
3,993,975	,,	Dec. 14	3		3 p. c. Con. Deb.	99—101	+1	2 19 5
70,000	10	Nov. 15	8	Hongkong & China, Ltd.		13½—14½	..	5 10 4
3,800,000	Stk.	Nov. 15	10	Imperial Continental		215—220	..	4 10 11
473,600	Stk.	Feb. 9	3½	Do. 3½ p. c. Deb. Red.		100—103	..	3 8 0
75,000	5	Dec. 14	6	Malta & Medn., Ltd.		4½—5⅛	..	5 9 1
560,000	100	Oct. 2	5	Met. of Melbourne	5 p. c. Deb.	110—114	..	4 7 9
					4½ p. c. Deb.	107—109	..	4 2 7
250,000	100	,,	4½	Monte Video, Ltd.		11—12	..	5 0 0
541,920	20	Nov. 15	3	Newc'tle & Gatesh'd Con.		215—220*	..	4 4 1
617,946	Stk.	Feb. 23	9½	Do. 3½ p. c. Deb.		104—107	..	3 5 5
264,855	Stk.	Dec. 29	3½	Ottoman, Ltd.		4⅜—5⅛*	..	6 13 4
60,000	5	Feb. 23	7					

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	Nov. 30	8	Oriental, Ltd.	7—7½	..	5 6 8
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—6⅝	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1⅝	..	4 11 5
500,000	100	Dec. 1	6	People's Gas of Chicago	4 2nd Mtg. Bonds	102—106	..	5 13 2
851,070	10	Oct. 13	7	River Plate Ord.		11—11½	+¼	6 1 9
250,000	Stk.	Dec. 29	4	Do. 4 p. c. Deb.		99—101	..	3 19 3
250,000	10	Sept. 15	10	San Paulo, Ltd.		12—13	..	7 13 10
135,000	Stk.	Sept. 15	10	Sheffield A.		249—251	..	3 19 8
209,053	,,	,,	10	Do. B.		249—251	..	3 19 8
447,427	,,	,,	10	Do. C.		249—251	..	3 19 8
5,600,000	Stk.	Feb. 23	5½	South Metrop., 4 p. c. Cm.		132—135*	..	3 19 0
1,520,000	,,	Jan. 12	3	Do. 3 p. c. Deb.		100—102	..	2 18 10
120,000	Stk.	Aug. 31	6	Tottenham and Edmonton	A. 5 p. c. B. 3½ p. c. 4 p. c. Deb.	141—143	..	4 3 11
250,520	,,	,,	4½			102—104	..	4 6 6
55,100	,,	Dec. 14	4			113—117	..	3 8 5
182,380	10	Jan. 12	5	Tuscan, Ltd.		8½—9½	..	5 5 3
149,900	10	Jan. 2	5	Do. 5 p. c. Deb. Red.		101—104	..	4 13 2
				WATER COMPANIES.			
780,399	Stk.	Dec. 29	11	Chelsea, Ord.		307—312	..	3 10 6
150,000	,,	,,	5	Do. 5 p. c. Pref.		157—162	..	3 1 9
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75		145—150	..	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb.		148—153	..	2 18 10
1,720,560	Stk.	Oct. 13	7	East London, Ord.		203—208	..	3 7 4
554,740	,,	Dec. 29	4½	Do. 4½ p. c. Deb.		145—150	..	3 0 0
890,000	,,	,,	3	Do. 3 p. c. Deb.		98—100	..	3 0 0
700,000	50	Dec. 14	7½	Grand Junction	10 p. c. max. 4 p. c. Deb.	108—110	..	3 8 2
810,000	Stk.	Sept. 29	4			131—126	..	2 18 10
708,000	Stk.	Feb. 23	14	Kent		330—340*	..	4 2 4
160,000	,,	,,	7	Do. New, 7 p. c. max.		200—210	..	3 6 8
1,043,800	100	Dec. 29	10½	Lambeth, 10 p. c. max.		295—300	..	3 10 0
406,200	100	,,	8	Do. 7½ p. c. max.		215—220	..	3 12 9
850,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb.		125—138	..	2 18 0
500,000	100	Feb. 23	13½	New River, New Shares		420—425*	..	3 2 0
1,000,000	Stk.	Jan. 26	4	Do. 4 p. c. Deb.		132—137	+2	2 18 5
902,300	Stk.	Dec. 14	7½	South-wark and Vauxhall	Ord. 7½ p. c. max. 5 p. c. Pref. 4 p. c. A Deb.	203—205	..	3 13 2
126,500	100	,,	7½			190—195	..	3 16 11
489,200	Stk.	,,	5			160—165	..	3 0 7
1,019,585	,,	Oct. 13	4			131—136	..	2 18 10
1,155,066	Stk.	Dec. 14	16	West Middlesex		290—295	+1	3 7 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb.		147—152	..	2 19 3
200,000	,,	Sept. 15	8	Do. 8 p. c. Deb.		100—102	..	2 18 10

*Ex div.

their overseers. The Town Council decided to let the communication lie on the table; but the resolution was only carried by a majority of one, which is the nearest that the labour agitators have yet come to carrying their point. The Corporation may be caught napping some day; and then, though it should be by a snatch vote, Glasgow would be added to the list of places where Trades Unions were recognized.

A petition was presented to the Gas Committee of the Dundee Town Council this week, by the inspectors of gas-meters, asking for an increase of wages. They seem to hold the belief that unless they ask much, they are not likely to receive much. Their request is for an advance of 5s. per week. At present, they are paid 32s. a week. The reasons for making this large request is that gas collectors receive 37s. and water inspectors 38s. a week, and that their duties are somewhat similar. This is an assumption which, I anticipate, will not be readily accepted. Anyone can read a gas-meter; but a water inspector requires to be a man skilled in the matter of fittings—a plumber, in fact—while a collector has very responsible duties. The petitioners may be deserving of some advance; but 5s. a week is out of the question. The application was sent to a small Committee for consideration.

At this week's meeting of the Dundee Corporation Gas Committee, the subject was raised as to the valuation of the gas-works. At present the valuation is fixed by the Burgh Assessor; but in some other places—Glasgow and Stirling were mentioned—this is done by the Assessor of Canals and Railways. It is suggested (by whom is not stated) that the valuation of the Dundee Gas-Works should be by the Assessor of Canals and Railways, who at present values the Dundee Water-Works. This is a method of valuation provided for undertakings which extend into the territories of more than one local authority; the object being to have one assessing party instead of several, or many, who sometimes differ as to apportionment. Unless there be some such difficulty, it does not seem that there is any necessity for a change in Dundee. The total valuation is determined, according to a well-known rule, by the amount of the net profit; and I suppose that apportionment is usually made upon a rough estimate of the sums expended within the various jurisdictions. Were it made upon the profit derived from each locality, rural places would suffer, because the gas consumption there is less per mile of main than it is within cities.

The Gas Corporation of Forfar would appear to feel very heavily the remarks of Sheriff Johnston in making the appointment of Public Auditors, to which I referred last week. On Wednesday night, at a meeting of the Corporation, Provost M'Dougall made a long speech upon the Sheriff's opinion, in which he complained about the Corporation being held up in the way they were, upon such a small matter. For upwards of twenty years, he said, they had been in the habit of suggesting names for the post of Auditor; and every Sheriff, till now, had given effect to their wishes. He did not doubt the authority of the Sheriff; and he believed that the gentleman who had been appointed was a person of great ability. They found that local gentlemen of intelligence and ability were quite willing to do the work for the fees they paid, and would give them an audit as true and as thorough as they could get from a chartered accountant of Dundee. Bailie Adamson endorsed the views of the Provost upon the subject. Now, I cannot avoid the conclusion that the speakers would have acted a more dignified part if they had preserved silence. They cannot help themselves in the matter. Though Bailie Adamson hinted at there being a possibility of their "making a representation in another quarter, which would condemn this very foolish interlocutor," as a matter of fact the Corporation can do nothing. The House of Commons is the only place where they could make a representation. The Right Hon. Mr. John Morley is their representative in Parliament; and if the Corporation think that he has time to attend to such a paltry matter, or that the House would listen to him upon it, they are mistaken. But they altogether ignored the Sheriff's grounds for his action. The members of the Corporation had been quarrelling among themselves upon the subject of the audit, and had, in fact, gone the length of procuring an independent audit of the gas accounts—a step which I criticized at the time as foolish, and which the Sheriff seems also to have so regarded. Then the Sheriff says that he is convinced they have not been getting the kind of audit which the statute intends. This was sufficient justification for him. The Corporation have brought themselves into this undesirable position. The Sheriff is to see that a real audit is made. It may turn out that this will result in no more than a change in the form of keeping the accounts of the Corporation; but, on the other hand, the new Auditor may disallow certain entries—say, of outlay—requiring them to be placed to another account, which may alter the appearance of things. The knowledge of this possibility should make the Corporation particularly careful how they prepare their accounts for the audit, because, if occasion should arise to find fault, they may be certain that it will be taken advantage of. And they know now that Sheriff Johnston is a gentleman who, if he wishes to tread upon anyone's toes, does so in a manner which leaves no doubt in the mind of the person trodden upon that it was intended, as well as that it had taken place.

With reference to the statement in last week's "Notes" to the effect that the Gas Committee of the Glasgow Corporation had caused intimation to be made to Messrs. John Watson, Limited, that, on account of non-delivery of coal, they would exercise the option in their contract of purchasing coal as against the short deliveries, the contractors explain that the period of the contract was from July 1 to June 30, with power to the Corporation to call for increased quantities during the winter months; that down to Feb. 14, of 50,000 tons of coal there had been delivered 30,046 tons; and that the balance will be delivered well within the specified time. The Corporation have not bought coal against them. The explanation does not affect the situation, because the delivery is more than 1000 tons short of what would have been a delivery in equal monthly instalments. If the Corporation have required increased deliveries during the winter months, they either have not had them or the deliveries before the advent of winter must have been extremely light. The Corporation may yet purchase coal as against the Company, as to which they will no doubt be guided by the course of events; but the explanation makes it plain how such a step would be received, and shows how difficult it is to enforce any such provision.

Last Monday morning, an explosion of gas occurred in the office of the Ardrossan Harbour Company. A charwoman in the course of her

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BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000
WINDSOR STREET WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000
WINDSOR STREET WORKS, BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000
HALIFAX	1,000,000	YORK	750,000
TORONTO	250,000	ROCHESTER	500,000
OTTAWA	250,000	KINGSTON, ONT.,	300,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000
MONTREAL	500,000	DULUTH, MINN.	300,000
TORONTO (Second Contract; Remodelled)	2,000,000	CATERHAM	150,000
BELLEVILLE	250,000	LEICESTER	2,000,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000
		BURNLEY	1,500,000

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duties lighted one of the arms of a gaselier in the Manager's room, and a violent explosion took place. Its force was such that two of the walls of the room were wrecked, nearly all the windows in the building were broken, and the door was blown outwards for several yards. The damage done will cost more than £200 to repair.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 24.

Sulphate of Ammonia.—There has been more business doing for prompt and early delivery; and quotations have advanced to from £12 to £12 2s. 6d. per ton delivered f.o.b. at the ports. Supplies have been somewhat larger; but, although the bulk has again been taken for "covering" purposes, consumers have come more into line with the situation. Home consumption, too, has been appreciable; and everything offered has been readily disposed of. There has not been much interest in the forward position—makers being firm at last week's quotations for the near months; but they show more anxiety to sell over the last six months of the year, for which period a considerable discount on prompt values would be accepted.

Nitrate of Soda is firm at 8s. 9d. per cwt. for fine quality on spot, and 9s. for spring months.

LONDON, *Feb.* 24.

Tar Products.—There is more life in benzols; and 90's have in some instances realized more money. The London shipments of benzol are undoubtedly better than at other ports; and in this position it commands a somewhat better price. There exists as much as 1d. difference between the value in London and some of the country ports. A large accession of benzol is said to have come upon the market from German sources; but the price is evidently on the move upwards notwithstanding. For naphthalene there is also an increasing demand, especially for such qualities as show a fairly high melting-point, and are in a thoroughly dry condition. Tar oils are firm, although the recent stormy weather has interfered very much with deliveries. Carbolic acid has fluctuated somewhat during the week; but, on the whole, the prices quoted below represent its average value at the various points of delivery. There is no change in anthracene.

The average values obtaining during the week are: Tar, 17s. to 26s. Pitch, east coast, 35s. 6d.; west coast, 33s. 6d. Benzol, 90's, ordinary, 7d.; special qualities for gas, 8½d.; 50's, 9d. Toluol, 90's, 1s. 2d.; pure, 2s. Solvent naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 4¾d. Heavy naphtha, 1s. 2d. Creosote, 3¼d. Heavy oils, 3¾d. Carbolic acid, 50's, 2s. 9d.; 60's, 3s. 2d. Crude naphthalene, 60s. Anthracene, nominal, "A," 4d.; "B," 2½d.

Sulphate of Ammonia is scarce and dearer. The advent of the spring and home demand has much strengthened the market. Producers hold small stocks; and the large makers are fully contracted. The general quotation throughout the country is £12 per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position in the coal trade of this district, although it does not as yet represent any easing down whatever in prices so far as the Lancashire collieries are concerned, is scarcely so strong as it was a week or so back. In some outside districts prices have been giving way on the full rates that were quoted recently; and supplies from one or two quarters have been coming in more plentifully than for a considerable time past. Lancashire collieries continue pressed with orders more than sufficient to take away their output; and any relief in the difficulty they have so long experienced in meeting the requirements of their customers is mainly in some of the better qualities of round coal, which have not been in quite so keen demand since the change in the weather. In the house-fire coal trade supplies are now fairly ample, although here and there complaints are still made that merchants and consumers have not yet received the full deliveries of coal that have been ordered. Common round coals are in much the same active demand as reported recently for iron-making, steam, and general manufacturing purposes; and Lancashire collieries have no surplus supplies of these to offer in the open market, as they have all they can do to keep up with the wants of their customers. Where they have any coal at all to dispose of, it meets with a ready sale for shipment, at considerably above inland prices. Slack also continues short at the Lancashire collieries, with the demand fully maintained, though in some outside districts sellers are prepared to book orders more freely, and the supplies of engine fuel offering on the market have been rather more plentiful. Prices at Lancashire collieries are all round exceedingly firm at full list rates of 14s. 6d. to 15s. 6d. per ton at the pit for best house coals, 13s. to 14s. for mediums, 12s. to 12s. 6d. for steam and forge coal, and from 10s. up to 11s. for engine fuel. For shipment, although the pressure of demand is perhaps not quite so great as it has been, it is still in excess of supplies offering at the ports on the Mersey; and special prices continue to be paid. Ordinary steam coal fetches 15s. 6d. to 16s. per ton, and better qualities of round coal 16s. 6d. to 17s., delivered at the Mersey ports or the Manchester Ship Canal. With regard to furnace and foundry cokes, there is no further official advance in list rates; but makers have so little to offer in the open market that from new customers they are readily able to obtain special prices.

Northern Coal Trade.—There has been a little ease in the coal trade of this district in the last few days, due partly to the lack of steamers to carry away cargoes, and partly to the natural declension that is often found at this season of the year. Best Northumbrian steam coals are now quoted from 18s. to 18s. 6d. per ton f.o.b., and steam smalls are about 11s. In both cases there is fairly full work, and the collieries are well employed; but there is no pressure of moment. In the gas coal trade, one or two additional contracts have been settled, but not to any great extent; the larger southern tendering not having been touched yet. As far as is known, the prices of the lots that have been sold—chiefly for Continental ports—have been such as to leave from 14s. to 15s. per ton

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as the f.o.b. prices for Durham gas coals. For occasional cargoes, the price asked is 16s. per ton f.o.b. There is a good demand for manufacturing coals; and prices are unaltered. Coke is in brisk demand; and best foundry coke seems to advance in price. This should benefit the gas coke trade, in which business is fairly good.

Scotch Coal Trade.—There is little change to report in the coal trade. The demand continues strong. The prices quoted are: Main 15s. to 15s. 6d. per ton f.o.b. Glasgow, ell 15s. 9d. to 16s. 6d., splint 15s. 6d. to 16s. The shipments for the week amounted to 189,035 tons—a decrease of 5545 tons upon the preceding week, but an increase of 58,475 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,191,836 tons—an increase of 143,772 tons upon the same period of last year.

Increase in the Price of Gas.—The Kingsbridge Gas Company have given notice that the price of gas will be increased from the 1st prox. by 6d. per 1000 cubic feet; bringing it up to 3s. 10d.

Suffocation by Gas.—Mr. Alfred Wood, aged 35, a commercial traveller, of Leeds, died at the Belfast Royal Hospital last Thursday from suffocation by gas. On Monday last week he left Leeds for his Irish journey. On Wednesday morning he was found in his bedroom at a temperance hotel in Belfast unconscious, and evidently suffering from suffocation by gas. The gas was fully turned on. He was removed to the hospital, but all attempts to restore him were unsuccessful. There is every reason to believe that the disaster was accidental.

Hull Gas, Electricity, and Water Undertakings.—Mr. Alderman Jarman, Chairman of the Finance Committee, made some congratulatory remarks at the meeting of the Hull City Council on Monday last week, concerning the results of the management of the gas, electricity, and water undertakings. Regarding the first, he confessed that at one time he was opposed to the purchase of the Kingston-upon-Hull Gas Company's property, the cost of which was put down in the books at £96,300. But during the two years they had had the works, they had not only paid their way, but provided sufficient sums for the sinking fund and interest. The charge to the consumers had also been reduced by 2d. per 1000 cubic feet. The cost of the electric light undertaking stood at £130,000. The light was now in general use; and the concern was able not only to pay its way, but to provide money for sinking fund and interest, and also for the provision of a reserve fund. He hoped before long they would be able to have some relief from the undertaking. The water-works stood in the books at £475,980; and in regard to this undertaking, he questioned whether if a million sovereigns were laid on the table, the Council would accept them in exchange. This heritage they had not only maintained and increased, but had kept in perfect order, under the late Alderman Woodhouse and the present Chairman of the Committee (Alderman Massey). They congratulated the Chairman not only upon the able manner in which the works were being managed, but upon the splendid help the profits had been for several years past in relieving the rates.

The Dorking District Councils and the Water Company's Bill.—The Urban and Rural District Council of Dorking are opposing the Bill promoted by the Water Company, with the view of getting the insertion therein of a clause giving them power to purchase the undertaking within ten years. A Joint Committee of the above-named bodies had an interview with the Directors of the Company on the matter, and the latter expressed their willingness to insert a clause if the period were made twenty years; but this offer has not been accepted.

Wolverhampton Gas Company's Bill.—At the meeting of the Wolverhampton Town Council on Monday last week, the Town Clerk explained the provisions of the Bill by which the local Gas Company are applying for extended capital powers. He said that at the present time, the capital of the Company amounted to £260,861; and it was proposed to increase it by £175,000. The capital was increased seven years ago; and he contended that the dividends paid were too high. Another reason for opposing the Bill was that the illuminating power was not sufficiently high; and, further, the Corporation ought to have greater scope in regard to the breaking up of the streets. Some discussion followed; and it was decided to oppose the Bill—the Lighting Committee being entrusted with the necessary powers.

City of St. Petersburg New Water-Works Company, Limited.—At the ordinary general meeting of this Company to-day, the accounts to be submitted by the Directors, covering the year ending Dec. 31 last, will show that the instalments payable by the Municipality of St. Petersburg for 1899-1900 on account of the purchase-money of the Company's works amounted to £17,542, of which £6793 was applicable to capital; leaving a balance of £10,749. Interest and fees brought up this sum to £10,789. After payment of interest and expenses, there is a balance of £5558 available for distribution. An interim dividend of 5s. per share was paid in September last; and the Directors recommend that a further dividend of 5s. 6d. per share be paid, that £500 be placed to the reserve fund, and that the balance (£19 6s. 6d.) be carried forward. During the past year, £6600 of "A" debentures were paid off; leaving £5900 outstanding, the whole of which is repayable this year.

Gas and Electric Lighting at Coventry.—The following is the statement of the Gas Committee of the Coventry Corporation for the quarter ending Dec. 31: Gas made, 165,569,000 cubic feet; do., 1898, 151,172,000 cubic feet—increase, 14,397,000 cubic feet, or 9·52 per cent. (Gas made during the nine months ended Dec. 31, 1899, 373,430,000 cubic feet; do., 1898, 342,450,000 cubic feet—increase, 30,980,000 cubic feet, or 9·04 per cent.) Gas-rental, £18,658; do., 1898, £16,947—increase, £1711. Number of consumers, 8179; do., 1898, 7511—increase, 668 or 8·89 per cent. Stoves on hire, 2559; do., 1898, 2212—increase 347 or 15·68 per cent. Length of mains, 58 miles 131 yards; do., 1898, 56 miles 1006 yards—increase, 1 mile 885 yards. Average illuminating power, 17·35 candles; do., 1898, 17·70 candles. Average sulphur compounds, 19·45 grains, do., 1898, 13·34 grains. The quarterly statement of the Electric Light Committee shows the number of consumers on Dec. 31 last to have been 198, against 128 on the same day twelve months ago; and the rental for the past quarter to have been £1340, compared with £1042.

"Bringing his goose to be cooked."

Acetylene Lighting at Sydney (N.S.W.).—On Thursday, Dec. 21 last, the Cricket Ground at Sydney was experimentally lighted by acetylene; the plant having been arranged by Mr. W. Tyree, Managing-Director of the Acetylene Gas Company of Australasia, Limited. There were 3000 lights in use; and provision has been made for 2000 more if required. Suspended over the racing track were 163 shades, each containing a number of burners, and impervious to wind or rain. The shades were attached to light angle-iron supports 15 feet from the track and 16 feet apart. The trial was successful; and it was intended to start the lighting the following night.

The Budleigh Salterton Gas-Works Flooded.—Owing to heavy rain following upon a fall of snow, severe floods have lately prevailed in the western counties. The Budleigh Salterton Gas-Works were a few days ago invaded by the water from a stream which overflowed its banks. The water reached a depth of more than 2 feet in the retort-house; and a considerable amount of damage was done to the works generally. The Manager (Mr. W. S. Walker) took prompt measures to minimize the mischief; and the water was as quickly as possible diverted into another channel. Gas making was, however, seriously interrupted, and the public lamps could not be lighted on the day of the accident.

Incandescent Gas Lighting at Seaford.—The Seaford District Council have had before them a report by their Surveyor on the question of incandescent gas lighting which may interest other authorities of small towns who desire improved street lighting at low cost. The report stated that there were 68 lamps in the district, 48 of which were supplied with incandescent burners; and to 43 of the lamps meters were affixed—the others being averaged for payment. It was found that each incandescent lamp, on an average, consumed 9100 cubic feet of gas per annum; and those with ordinary burners 13,000 cubic feet. The quantity of gas consumed during the three years had decreased. In 1897 the total consumption was 734,000 cubic feet; in 1898, 712,000 feet; and in 1899, 688,000 feet. It was recommended that the whole of the lamps in the district be provided with incandescent burners, and that additional ones be fixed. The report was adopted.

A French Gas Lighting and Meter Making Company.—The Compagnie pour l'Eclairage des Villes et Fabrication des Compteurs et Appareils Divers, the offices of which are in Paris, although less well known in England than some of the other Continental undertakings, is a flourishing concern. The Company at the present time own 34 gas-works, supplying light to more than 40 towns of the adjacent communes, as well as seven water-works. This number may soon be augmented, because by a recent increase of capital, bringing it up to 4,000,000 frs. (£160,000), funds are available for fresh acquisitions. The Company manufacture the plant for their works, and have a considerable number of customers. These are rapidly increasing; and in order to be in a position to supply them at less expense, they have established agencies in provincial towns of France and in foreign countries. One was recently opened at Lille, another at Madrid, and more are to follow. In each of the past four years, the Company have paid a dividend of 25 frs. on their shares of 500 frs.

The Reigate Corporation and the Redhill Gas Company's Bill.—The Reigate Corporation have resolved to oppose the Bill promoted by the Redhill Gas Company to obtain further powers; and the resolution has been confirmed by the ratepayers.

Ashford and the Mid-Kent Water Bill.—It is stated that at an interview between Mr. William Whitaker, F.R.S., F.G.S., and the Ashford District Council, the former advised opposition to the Mid-Kent Water Company's Bill with the view of obtaining a clause which should prevent the Company from sinking wells within 4 miles of the Ashford town supply. The majority of the Council, however, declined to take any steps in the direction indicated. It is understood that the area from which the local supply is drawn is only about a square mile in extent; but many of the councillors seem to think this ample to afford an adequate supply.

Heysham and the Morecambe Gas Bill.—A meeting of ratepayers was held at Heysham on Monday last week to confirm a resolution of the District Council to oppose the Morecambe Gas Bill. The Chairman (the Rev. C. T. Royds), basing his remarks on a report presented to the Council by Mr. Silverthorne, said Morecambe had given an exorbitant price for their gas-works; and he calculated that there would be a deficit of £3000 per annum. This would either have to be met by an increase in the price of gas or out of the rates. He thought the former alternative would be selected, in which case consumers would be charged up to the limit of 5s. per 1000 cubic feet. Mr. Silverthorne advised them that for £10,000 they could erect gas-works of their own at Heysham to produce 11 million cubic feet per annum; and, allowing £2000 for the purchase of the existing mains and pipes from Morecambe, they could manufacture their own gas at 2s. 6d. per 1000 feet, and supply it to consumers at the very moderate sum of 3s. 7d. Heysham ought to command its supply of gas and water. The resolution to oppose the Morecambe Bill was carried unanimously.

Reconstruction of the Madrid Gas Company.—In the report presented by the Directors at a recent extraordinary general meeting of this Company, it was stated that the greatest advantage the undertaking could derive from the new contract which has been entered into with the Municipality would consist in the increased consumption of gas resulting from the reduction of the price. To profit by this circumstance, however, great expense would have to be incurred to extend the use of gas in Madrid, and bring it to a figure proportionate with the population. New mains would have to be laid, and gas cooking and heating appliances provided for the consumers. Most of the Company's capital having been exhausted, it has been decided to increase it from 11,400,000 to 17,000,000 pesetas, by the issue of 22,400 5 per cent. preference shares of 250 pesetas each. After payment of this dividend, one at the same rate will be paid on the ordinary shares; and the balance will be divided among all the shareholders. The Municipality of Madrid having relinquished their right to purchase the Company's works and mains, the assets remain the property of the shareholders. The Company have a substantial reserve fund composed of accumulation of the annual deduction of 5 per cent. from the profits realized.

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Season 1899-1900.

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The Opposition to the Exmouth Water Bill.—A poll of the ratepayers on the question of the water supply has given a large majority in favour of the policy supported by the District Council. On the question whether the Council should promote a Bill for the purchase of the waterworks, 1406 voted in the affirmative and 843 against—a majority of 563. On the second question, as to whether the Council should oppose the Bill promoted by the Water Company, the voting was: In support of the opposition, 1299; against it, 778—majority, 521.

The Yeadon Water Supply and Lead Poisoning.—Dr. M'Lean, the Medical Officer of Health of Yeadon, in a report states that his analyses of the water supply of the town during the past year have shown that it contains lead varying in quantity up to ½ a grain per gallon; and he has had fifteen cases more or less severe under his notice. He recommends the prohibition of lead pipes in all new dwellings, but, as regards existing houses, considers that the responsibility lies on the Water Company of so treating the water as to prevent action on lead.

Kingsbridge Water Supply.—Another inquiry was held at Kingsbridge last week by Mr. E. A. Sandford Fawcett, a Local Government Board Inspector, respecting a scheme for providing a new water supply for the town. The subject has been under consideration for a long time, and large expenditure has been incurred in connection with schemes which, for one reason or another, have proved impracticable. The present one has been prepared by Messrs. Santo Crimp, Taylor, and Co.; and the former gentleman gave evidence. He said that only two sources of supply could be recommended, and one of these, which was situated on Dartmoor, was unsuitable because of the distance the water would have to be conveyed. Place Moor, from which it was proposed to obtain the water, was nearer, and would afford an abundant supply for the needs of the population. The elevation of the proposed reservoir would be 368 feet, and it would contain 14 million gallons. The gathering-ground covered 140 acres. There would be a service reservoir and filter-beds.

The Gas Workers' Union.—We learn from the report of the General Secretary of the Union (Mr. W. Thorne) for the quarter ending Dec. 30 last, that the branch receipts amounted to £5544, and the other receipts to £25; making a total of £5569. This is an increase of £168 on the quarter, and of £868 on the corresponding period of 1898. The total membership at the end of the quarter was 48,030—a gain of 2361 on the three months, and of 4556 on the last quarter of 1898. The sum of £1293 was gained for the members in wages cases and compensations for injuries; bringing the total amount up to £8235. Mr. Thorne states that the Union were successful in obtaining better conditions of employment for the members in various places, particulars of which are given. In the report of the General Organizer (Mr. Pete Curran), reference is made to the trouble at the Dalmarnock Gas-Works, Glasgow. This is characterized as a "most unfortunate affair," as the Society had only been established a few months in Glasgow, and the men's hasty action furnished the opponents of the Union with a strong argument against recognizing it. The difficulty of keeping such an organization as the Gas Workers' Union together is shown by the fact that Mr. Curran travelled 15,500 miles and addressed 376 meetings last year.

Extension of the Devonport Water-Works.—In order to meet the requirements of a growing suburban population, the Devonport Water Company have constructed on the outskirts of the borough a new service reservoir. It is 151 feet long and 107 feet broad; and with a depth of 12 feet of water it has a capacity of a million gallons. It has been constructed of concrete and brickwork, and is covered with seven brick arches, each 151 feet long and 14 feet span, resting on 66 brick piers and the side walls. The face bricks are glazed. The bottom is on slate rock, and consists of concrete 12 inches thick, on which is laid bitumen sheeting covered by paving 2 inches thick. The top water-level is 272 feet above Ordnance datum, and 87 feet below the filter-beds at Crownhill, from which the supply will be delivered. A 15-inch main is laid from the reservoir to the district which it is to supply. On this main, adjoining the valve chamber, a Venturi meter has been fixed. The work has been carried out from the designs of Mr. H. Francis, Assoc.M.Inst.C.E., Engineer to the Devonport Water Company, under the superintendence of Mr. B. Townsend, Assoc.M.Inst.C.E.

The Directors of the Leeds Fire Clay Company, Limited, have declared the usual interim dividend on the ordinary shares for the six months ending Dec. 31, at the rate of 5 per cent. per annum.

Messrs. R. & A. Main, Limited, held an exhibition of their gas stoves and appliances, at the Wesleyan School, Westbury Park, Bristol, last week; assisted in the demonstration of the value of gas for cooking purposes by Miss Amy Wilkinson.

The Labour-Employing Committees of the Birmingham Corporation are uniting in the formation of a Joint Special Committee, to consider the general application of their workmen for advances of wages. The matter was referred to on p. 486 last week.

The Directors of the Gas, Water, and General Investment Trust recommend dividends at the rate of 4½ per cent. per annum on the preferred shares, and of 4 per cent. per annum on the deferred stock, for the half year ended Jan. 28; carrying forward £4649.

The Directors of the Lambeth Water Company will be prepared to receive, not later than noon on Monday next, sealed tenders for £75,000 redeemable 3 per cent. debenture stock, to be paid up in full on or before the 31st of March. The interest thereon will commence to accrue from that date.

In order to safeguard the water supply of Wolverhampton, the Corporation have decided to oppo e the Bill of the East Shropshire Water Company. It is proposed by the latter to sink wells at Blymhill, Sheriff Hales, and Shifnal, and one of the wells would be within three miles of the Corporation Water-Works at Cosford.

The Dundee Gas Committee have accepted tenders for the supply of new machinery and plant for the reconstructed portion of the gas-works, among which are the following: Charging and drawing machinery, Messrs. Sir William Arrol and Co., Limited, of Glasgow; station meter of 150,000 cubic feet per hour capacity, Messrs. James Milne and Son, Limited, of Edinburgh.

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28, BATH STREET.
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
1, OOZELLS STREET.
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WINTER SEASON 1899-1900.

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Complete Fire List may be had on application.

A well-deserved compliment was paid to Messrs. Pope and Pearson at the last monthly meeting of the Bingley District Council. In moving the adoption of the minutes of the Gas Committee, Mr. Gatecliff mentioned that the Committee had had considerable difficulty in securing the necessary quantity of coal from the Company who held the contract for the supply; but the above-named firm had come to the rescue and saved the town from darkness.

The State Geologist of Indiana, who has recently made a thorough investigation of the condition of the natural gas belt of that State, reiterates his belief that the supply of gas in Indiana can last but a short time, and that the end of its usefulness for manufacturing purposes is practically in sight. The pressure he finds to be gradually and steadily decreasing. Since the field was opened 13 years since, 5400 wells have been sunk. Of these, 2800 have been exhausted—leaving only 2600 wells now producing; while the number is declining month by month.

According to the report which the Directors of Richmond and Co., Limited, will present at the ninth ordinary general meeting of shareholders, to be held to-day at the Company's Stratford works (which have been largely extended), last year was a most satisfactory one; the sales having increased about 50 per cent. as compared with those in 1898. The Directors report that the profit-sharing policy continues to produce most satisfactory results. The profit for the year was £11,524, which, with the £601 brought forward, is made up to £12,125. Out of this it is proposed to declare a dividend of 6 per cent. on the preference shares; one at the rate of 10 per cent. per annum, free of income-tax, on the ordinary share capital; pay the Managing-Director and the Warrington and London General Managers their commissions on the year's profits (as per agreement); allocate £1500 to the profit-sharing fund; make up the reserve fund to £10,000; and write off £1800 for further depreciation. There will then be left a balance of £1204 to be carried forward, subject to the vote for the Directors' remuneration. There is to be a further issue of capital, which will exhaust the Company's powers; and it is intended, with the shareholders' sanction, to create more.

We have received "'The Electrician' Electrical Trades Directory and Handbook for 1900." This is the eighteenth year of publication; and the increased bulk of the present edition as compared with its predecessors is a testimony to the great development of the electrical industry. The book contains two enormous sheet tables which furnish engineering data concerning the supply of electricity for light, power, and traction in the United Kingdom. The information thus supplied is exceedingly valuable; and it is almost to be regretted that it is presented in a somewhat unwieldy form. There is also a map showing the electric supply stations of which particulars are given in one of the tables. It is stated that the contents of the volume have been corrected up to the 31st ult. The book contains a mass of matter, carefully indexed, relating to all branches of the electrical industry; and it will be found very useful by local authorities and other public bodies concerned in the supply of electricity or in the installation of works for this purpose. Not the least interesting portion of the book is the Biographical Division, which has been specially prepared for the "Directory." It extends over 133 pages; and the notices are accompanied by numerous portraits printed on plate paper.

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[For Illustrated Advertisement, See Feb. 6, p. 366.]

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WANTED, by a Gas Company in York-shire, a CLERK about 20 to 25 Years of Age, who has had experience in Gas Office Work.

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THE DERWENT VALLEY WATER BOARD

APPOINTMENT OF ENGINEER.

BY the Derwent Valley Water Act, 1899, the Derwent Valley Water Board are authorized to construct six large Reservoirs in the Valleys of the Derwent and the Ashop in Derbyshire, together with important subsidiary Works in connection therewith to deal with an estimated flow of Fifty Million Gallons of Water per day. The Reservoirs will be constructed successively; and the execution of these and the other authorized Works is expected to occupy many Years.

Applications are now desired for the position of ENGINEER to the Board. The Engineer will be responsible for the Designing and Construction of the Works. He will be required to reside in the neighbourhood of the Works, and to devote the whole of his time to his duties under the Board, and to have daily personal charge of the work in hand. The staff of Assistants, Inspectors, Draughtsmen, Clerks, and others necessary in the carrying out of the work will be provided by the Board, and be under the direction of the Engineer.

The engagement will (subject to the services rendered being satisfactory) be certainly until the first two Reservoirs are completed (this work it is estimated will take some Ten Years to carry out), and may be a permanent one. The Engineer on his part will be required to enter into an agreement to remain in the exclusive service of the Board until the first two Reservoirs are completed. The Board reserve the power of determining the engagement with the Engineer on giving him Six Months' Notice, in case his services are not considered satisfactory.

It is indispensable that Candidates for the appointment should have had considerable experience in designing and constructing Reservoirs and Gravitation Water-Works.

The Board reserve the right (which they will probably exercise) to appoint, or take the opinion of, a Consulting Engineer or Consulting Engineers on the Works, when and as desired.

Each Applicant must furnish at least two References and *copies* of Testimonials (which cannot be returned, and which preferably should be printed); the Board having the right to call for the production of the originals.

Applicants must state Age, Experience, Present Position, Salary required, when at Liberty, and general state of Health. Personal Canvassing will be a disqualification.

Communications to be sent to me not later than the 10th day of March, 1900, marked on the outside "Derwent Valley Engineer."

JAMES BELL,
Clerk to the Board.
Rowton Buildings, Bowling Green Street,
Leicester, Jan. 17, 1900.

OUTDOOR Foreman wanted, experienced in Main and Service Laying, Gas-Fitting, &c. Must be able to advise Consumers, make Sketches, Measure up Work, &c.
Apply, by letter, to No. 3436, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Travellers to push the Sale of GOVERNORS for Street and Incandescent Gas Lighting, on Commission. Must be well connected with Gas Managers.
State which Districts covered, and full Particulars, to No. 3435, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Draughtsman used to general Gas and Water Works Construction, and able to take out Strains and Stresses.
Apply, by letter, stating Experience, Age, Single or Married, and Salary required, enclosing three References, to No. 3440, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Young Gas-Fitter of good address to act as METER INSPECTOR and SLOT METER COLLECTOR, filling up spare time in fixing Cookers, attending to Incandescent Lamps, and general House Fitting. An Abstainer preferred.
Apply, with Testimonials, and stating Wages required, to No. 3441, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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Hours, 54 per week. Wages, 8d. per hour, rising to 8½d. per hour.
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The Annual Production of Gas is 12 million cubic feet.
Canvassing Members of the Council will be a disqualification.
Applications, with *copies* of not more than three Testimonials of recent date, to be sent to me not later than the 5th of March.
G. S. SOWTER,
Clerk to the Council.
Brigg, Feb. 21, 1900.

WANTED, Two second-hand Purifying- BOXES, about 12 feet square, Covers, Lifting Apparatus, and Connections.
Apply to HERBERT UNWIN, Assoc.M.Inst.C.E., Dowdeswell Court, Andoversford, R.S.O., GLOS.

TO BUYERS OF SPENT OXIDE.

WANTED, Names of Firms willing to purchase Spent Oxide.
Apply, by letter, to No. 3424, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A 60-inch Letheby-Bunsen PHOTOMETER, and complete TESTING APPARATUS for Sulphur and Ammonia. All new in 1895.
Apply to H. MATTHEWS, Gas Examiner, CHELTENHAM.

ENGINES and Exhausters, from 1500 to 30,000 cubic feet per hour, in Stock, ready for delivery. No reasonable offer refused.
J. F. BLAKELEY, Thornhill, DEWSBURY.

LIVESEY Washer, 1 Million per diem, 18-inch Valves. MORRIS & CUTLER'S CONDENSER, 18-inch Valves. All in perfect order, and cheap.
J. F. BLAKELEY, Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TEST-HOLDERS FOR SALE.

TWO 11 Cubic Feet Test-Holders for SALE, with 2-inch Connections, and in working condition.
For Particulars apply to
S. DYSON,
Gas-Meter Testing Office, Manchester.

FOR SALE — A Washer by Cockey.
Size 10 ft. by 4 ft. 9 in. by 3 ft. 9 in., in four Compartments, with Manholes, Water-Supply Pipes, and 6-inch Gas Connections. All in good condition. Suitable for a Gas-Works making 12 millions a Year and under.
For Particulars, apply to the MANAGER, Gas-Works, Whittington, near Chesterfield.

RICHMOND GAS COMPANY.

FOR SALE—A Second-hand Two-Lift GASHOLDER of about 120,000 cubic feet capacity, with Column Guide-Framing and Cast-Iron Tank complete. Can be seen at the Richmond Gas-Works.
Offers for the whole as it stands to be addressed to
THOMAS MAY,
Engineer and Secretary.
Feb. 15, 1900.

RADCLIFFE AND PILKINGTON GAS COMPANY.

TENDERS FOR PIPES.

THE Directors of this Company invite TENDERS for the supply of 1400 Yards of 10-inch Spigot and Socket CAST-IRON GAS-MAINS, and a number of SPECIALS.
Further Particulars may be obtained from the undersigned, by whom Tenders will be received until Tuesday, the 6th day of March.
JAMES BRADDOCK,
Manager and Secretary.
Gas-Works, Radcliffe,
Feb. 23, 1900.

RAMSGATE CORPORATION.
(GAS DEPARTMENT.)

TENDERS FOR TAR.

THE Gas and Water Committee invite TENDERS for the surplus TAR (150,000 Gallons or thereabouts), to be made between the 1st of April, 1900, and the 31st of March, 1901.
Tenders to be returned on or before March 10, addressed to the Chairman of the Gas and Water Committee, Boundary Road, Ramsgate, and endorsed "Tender for Tar."
The Committee do not bind themselves to accept the highest or any Tender.
Full Particulars on application to
WILLIAM A. VALON,
Engineer.

BOROUGH OF BEVERLEY.

THE Gas Committee are prepared to receive TENDERS —
No. 1 CONTRACT.—For TELESCOPING present 100 feet diameter HOLDER.
No. 2 CONTRACT.—For a STATION METER.
Plans may be seen on application to Mr. James Gibson, the Gas Manager; and Specifications may be obtained from him on payment of £1 1s., which will be returned upon receipt of a *bonâ-fide* Tender.
Tenders, endorsed "Tender for Gasholder" or "Tender for Station Meter," as the case may be, must be sent to the undersigned on or before Wednesday, the 28th of February, 1900.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
J. WILLIS MILLS,
Town Clerk.
Beverley, Feb. 15, 1900.

CORPORATION OF LEICESTER.

IRON ROOFING.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and erection of two ROOFS, each about 144 feet long and 58 feet and 38 feet span respectively, at their Aylestone Road Works.
Drawings may be seen, and Specifications and Form of Tender obtained, upon application to the Engineer, and on payment of the sum of £10, which amount will be returned upon receipt of a *bonâ-fide* Tender.
Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Roofs," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, March 10.
The Committee do not bind themselves to accept the lowest or any Tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Feb. 24, 1900.

CORPORATION OF LEICESTER.

LANCASHIRE BOILERS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and erection, on Foundations provided, of three LANCASHIRE BOILERS, 30 ft. by 8 ft. 6 in., at their Aylestone Road Works.
Specification and Form of Tender may be obtained upon application to the Engineer, and on payment of the sum of £5, which amount will be returned upon receipt of a *bonâ-fide* Tender.
Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Boilers," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, March 10.
The Committee do not bind themselves to accept the lowest or any Tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Millstone Lane,
Leicester, Feb. 24, 1900.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS AND IRONFOUNDERS.

THE Directors of this Company invite TENDERS for the supply and erection of IRON and STEEL WORK required in the construction of Fifteen Settings of Ten Retorts each at their Grimesthorpe Works, as follows: Buckstaves, Cross Girders, Ascension, Arch, and Dip Pipes, Hydraulic Mains, Gas and Tar Mains, &c., 300 Retort Mouthpieces, with Self-Sealing Lids, and about 840 lineal feet of 30 inches and 36 inches diameter Steel Foul Mains, and Wall Brackets, Suspenders, &c.
Specification, Quantities, and Forms of Tender may be obtained from the Company's Engineer, Mr. J. W. Morrison, on and after the 22nd inst.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Retort-Fittings, &c.," must be delivered to the undersigned, by post, not later than the first post on Saturday, March 3, 1900.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Feb. 17, 1900.

LONG EATON GAS COMPANY, LIMITED.

THE Directors invite Tenders for the EXTENSION of RETORT-HOUSE, RETORT-BENCH, &c., including SETTINGS of RETORTS, with REGENERATIVE FURNACES, CONDENSER, EXHAUSTER, and PURIFIERS.
Particulars may be had, after the 2nd of March, from Mr. STEVENSON, at the Works.

COWES URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

TENDERS FOR PURIFIERS.

THE Gas Committee invite Tenders for the supply and erection, at the Gas-Works, Cowes, of Two PURIFIERS, 20 ft. by 20 ft., with 12-inch Connections and Centre or Four-Way Valves, complete with Lifting Apparatus, Rails, &c.
Sealed Tenders, endorsed "Tender for Purifiers," and accompanied by Tenderer's own Plans, Specifications, and full Particulars, to be delivered to the undersigned not later than Thursday, March 22.
The Council do not bind themselves to accept the lowest or any Tender.
WILLIAM HALLIDAY,
Secretary.
40, High Street, Cowes, I.W.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the various WORKS required in the erection of a RETORT-HOUSE at the York Street Gas-Works.
Plans and Specifications may be seen, and Bill of Quantities obtained, on application to the undersigned.
Tenders, endorsed "Retort-House, York Street Works," and addressed to the Chairman of the Gas Committee, Municipal Buildings, Leeds, will be received not later than Monday, the 26th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. TOWNSLEY,
General Manager.
Gas Offices, Leeds, Feb. 21, 1900.

NEWCASTLE AND GATESHEAD WATER COMPANY.

TO be Sold by Auction, in the Board- Room of the Company's Offices, Pilgrim Street, Newcastle-on-Tyne, on Tuesday, the 20th of March, 1900, at Half-past Twelve o'clock precisely, by Mr. CHARLES A. JOEL, in such Lots as are provided for in the said Company's Act of 1894—
FORTY THOUSAND POUNDS OF FIVE PER CENT. PREFERENCE STOCK (1894).
Printed Particulars and Conditions of Sale may be had at the Company's Offices; and Messrs. George Armstrong and Sons, Solicitors, Newcastle-on-Tyne; or of the Auctioneer, 66, New Bridge Street, Newcastle-on-Tyne.
GEORGE SMITH,
Secretary.
Newcastle-on-Tyne,
Feb. 7, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburbax, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.
He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.
Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of the late Mr. R. Kemp.
The FREEHOLD GAS-WORKS, situate at BAGSHOT, SURREY, within a short distance of the Station, and comprising two Gasholders, Retort-House (with ten Retorts), Coal-Store, Condenser, two Purifiers, and Governor-House, together with the whole of the Mains, to be sold as a going concern, and with possession on completion of the purchase.

MR. ALFRED RICHARDS has received Instructions to SELL THE ABOVE BY AUCTION (in conjunction with Messrs. WALKER AND FINN), at the Mart, E.C., on Tuesday, March 6, at Two o'clock precisely.
Particulars of Messrs. REEP, LANE, AND CO., Solicitors, BAGSHOT; of Messrs. WALKER AND FINN, Auctioneers, EGHAM; and of Mr. ALFRED RICHARDS, Auctioneer, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
PLYMOUTH AND STONEHOUSE GAS COMPANY.

NEW ISSUE OF £4000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 20, at Two o'clock, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

£4500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 20, at Two, in Lots.
Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

BRENTFORD GAS COMPANY.

NOTICE.

THE Directors of the Brentford Gas Company, having reconsidered the proposed issue of FOUR PER CENT. PERPETUAL DEBENTURE STOCK of the Company, find it expedient to CANCEL and WITHDRAW the PARTICULARS and CONDITIONS OF SALE BY TENDER of such DEBENTURE STOCK.

Any persons who have already sent in Tenders for such Debenture Stock are hereby requested to apply for the return of their Deposits.

By order,
WILLIAM MANN,
Secretary.

Office, Brentford,
Feb. 23, 1900.

COLNE VALLEY WATER COMPANY.

NOTICE is Hereby Given, that it is the intention of the Directors of the above Company to SELL BY TENDER 1200 NEW ORDINARY SHARES of £10 each. Minimum Price, £18 per Share.

Particulars, with Form of Tender, can be obtained of the Company's Office; and Tenders must be sent in on or before the 5th of March, 1900.

By order,
W. VERINI,
Secretary.

Office: Bushey, Watford,
Feb. 19, 1900.

ALDERSHOT GAS AND WATER COMPANY.

ALDERSHOT GAS AND WATER ACT, 1896.

NOTICE is Hereby Given, that the Directors of this Company have authorized the SALE BY TENDER of

100 £10 "E" SEVEN PER CENT.
ORDINARY SHARES
(to be issued as fully paid) in this Company.

Tenders to be received not later than Two o'clock p.m., March 29, 1900.

Form of Tender and further Particulars can be had on application at the Offices of the Company.

By order,
R. W. EDWARDS,
Secretary.

General Offices: Victoria Road,
Aldershot, Feb. 16, 1900.

Mr. Josh. S. Lamb, deceased — By order of the Executors.

TO SMALL INVESTORS.

MR. ASHMOLE will Sell by Auction at the Angel Hotel, Ilford, on Thursday, March 8, 1900, at Six for Seven o'clock p.m., Three BRICK BUILT HOUSES known as Nos. 20, 21, and 22 Ley Street, Ilford (to be sold in separate Lots), £290 "A" STOCK and £900 "B" STOCK in the ILFORD GAS COMPANY, Fifty £1 SHARES in the BRITANNIA WORKS COMPANY, LIMITED, and Twenty £1 SHARES in the ILFORD SPORTS COMPANY, LIMITED, all fully paid up.

The Houses may be viewed by permission of the Tenants; and Particulars with Conditions of Sale obtained of Messrs. ROBINSON AND BRADLEY, Solicitors, 7, King's Bench Walk, TEMPLE, E.C., and of Mr. ASHMOLE, F.A.I., Auctioneer, Surveyor, and Estate Agent, Broadway, ILFORD.

BRIGHTON & HOVE GENERAL GAS COMPANY—£500 ORIGINAL STOCK. Dividend 11½ per cent.

WALTHAM ABBEY AND CHESHUNT GAS COMPANY—£530 FOUR PER CENT. DEBENTURE STOCK.

ST. MARGARET'S (HERTS) GAS COMPANY.—100 £5 SHARES. Dividend 6 per cent.

SOUTHAMPTON GAS COMPANY—£400 ORDINARY FIVE PER CENT. STOCK.

HYTHE AND SANDGATE GAS COMPANY—£10 ORIGINAL SHARES, Dividend 4 per cent.; and £10 FOUR PER CENT. PREFERENCE SHARES.

MESSRS. EDWIN FOX & BOUSFIELD will include in their next STOCK and SHARE AUCTION at the Mart, on Wednesday, March 7, at Two o'clock, in Lots, the above with Shares in other Companies.

Particulars of the AUCTIONEERS, 99, Gresham Street, LONDON, E.C.

"GAS, AND HOW TO USE IT."

A useful little Brochure, suitable for Distribution among Gas Consumers in the District of any Gas Company

BY

J. H. TROUGHTON.

Sample Copies 6d. *each.*

100, £2; 250, £4 10s.; 500, £7 10s.; 1000, £10.

The Pamphlet can be specialized to suit the Price of Gas and other Conditions of supply in any particular District, at a slightly increased Charge.

Prices for larger quantities of the Publisher:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

LONDONDERRY GAS COALS

FROM THE

LONDONDERRY COLLIERIES,

COUNTY OF DURHAM.

Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal as per Analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR,
COUNTY OF DURHAM.

HARDMAN & HOLDEN, LD.

ESTABLISHED 1820.

SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER.

Inquiries Solicited.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL CO., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500	Cub. Ft.
Illuminating Power . . .	16·9	Candles.
Coke (of good quality) . .	67·5	per Cent.
Sulphur	0·58	,,
Ash	2·73	,,

For Price, &c., apply to the
WEARDALE IRON & COAL CO., LD.
QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY
FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft
Illuminating Power	38·22 candles
Coke per ton	1,301·68 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21 JOHN STREET, ADELPHI, LONDON W.C.

New Sunlight Incandescent Company,

LIMITED.

Telegrams:
"IGNIFLUOUS, LONDON."

Telephone:
"947 HOLBORN."

33 & 34, Shoe Lane,
London, E.C.,

February 22nd, 1900.

Dear Sir,

My Directors think it necessary that I should write you with reference to a Judgment by Mr. Justice Buckley, given the other day in an Action which has been long pending between the Welsbach Company and our predecessors, the New Incandescent Company, under the Welsbach 1886 Patent expiring on the 12th proximo.

It will not escape notice that the Defendants elected to put no witnesses in the box, and allowed the Judge to come to his decision entirely upon the evidence of the **Plaintiffs** (the Welsbach Company), with the result that, while he has found the Patent valid, **he has declined to grant any kind of injunction.**

The Judgment therefore involves only a matter of money between the two Companies who were parties to the Action, and we understand that even this has been promptly appealed against.

While, however, the effect of the Judgment at present is of very little moment (the patent expiring in about a fortnight's time), the **application** of this legal decision will, it seems to us, be of immediate importance, as it will enable us, immediately after the 12th proximo, to supply our Customers with a new mantle, made in strict accordance with such decision, which will give excellent results, and will accordingly be protected from all further question.

We are, of course, aware that our Competitors will make what use they can of the Judgment between now and the 12th proximo, and **we have therefore made ample provision for protecting our Customers and supplying all their requirements during the next fortnight,** with full regard to Mr. Justice Buckley's ruling. After that date it will be our Customers, not our Competitors, who will be protected by his Judgment.

Any attempt, therefore, either by the Welsbach Company or its Travellers to intimidate you should be reported to us. We promise you it will be dealt with promptly.

Yours faithfully,

NEW SUNLIGHT INCANDESCENT CO., LTD.,
L'CE FLETCHER,
Secretary.

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

London Office: R. Cull, 34, Old Broad Street, E.C.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

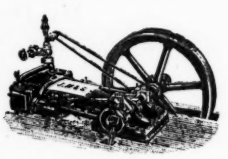
NITRATE of Thorium and Cerium.
Fabrik Chemischer Praeparate von Sthamer, Noack, and Co., Hamburg.

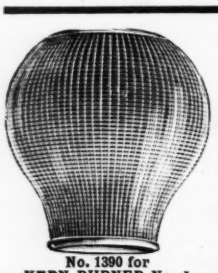
UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, near DEWSBURY.

THOMAS DUXBURY & CO.,
16, DEANSGATE, MANCHESTER.
GAS ENGINEERS' AGENTS AND CONTRACTORS FOR
Meters, Fire-Clay Goods, Oxide of Iron, and all other Gas Apparatus. Retort Carbon purchased.
Inquiries Solicited.
Telegrams: "DARWINIAN, MANCHESTER." Telephone 1806.

JAMES OAKES & CO.
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

JAMES MILNE & SON, LTD.,
GAS ENGINEERS
MILTON HOUSE WORKS EDINBURGH.
LONDON. —— LEEDS. —— GLASGOW.

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AN IMMENSE IMPROVEMENT
Has been made in the method of Manufacturing the
"HOLOPHANE" PATENT LIGHT DIFFUSING GLOBES.
The Globes are now MUCH LIGHTER in weight, MORE ARTISTIC in design, and MORE EFFICIENT in light control. An entirely new Series of Patterns. Send post-card for new Catalogue to
"HOLOPHANE" Ltd., 146A, Queen Victoria St., London, E.C.

WORKMANSHIP and MATERIALS OF THE HIGHEST QUALITY.
PECKETT'S LOCOMOTIVES
Built to any Specification or Gauge.
PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**

JOSEPH EVANS & SONS, **CULWELL WORKS, WOLVERHAMPTON.**

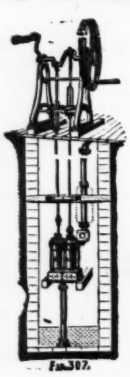


Fig.307.

PLEASE APPLY FOR CATALOGUE No. 8.

TRADE MARK.

FIRST AWARDS EVERYWHERE.

Telegrams: "EVANS, WOLVERHAMPTON." National Telephone No. 7039.

See next Week's Advertisement for Steam-Pumps, Tar and Liquor Pumps, &c.

CAUTION!

INFRINGEMENT OF COPYRIGHT "GAS FIXTURES."

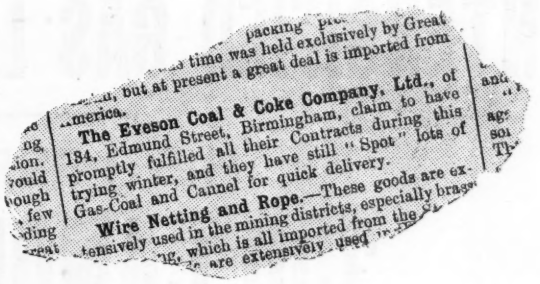
MESSRS. JAMES MILNE & SON, LTD., DIRECT THE ATTENTION OF MANUFACTURERS AND BUYERS OF GAS-FITTINGS TO A MEMORANDUM IN THE UNDER-NOTED TERMS WHICH HAS, AT THEIR DEMAND, BEEN HANDED TO THEM BY MESSRS. JOHNSTON PARK & CO., WHO BEAR THE EXPENSE OF THIS ANNOUNCEMENT.

15, Oswald Street, GLASGOW,
February 15th, 1900.

Johnston Park & Co., Gas-Fitting Manufacturers, Glasgow, having published a Catalogue entitled "Gas-Fixtures," in which use has, by inadvertence, been made of designs from the Gas-Fixtures Catalogue of James Milne & Son, Limited, Gas Engineers, Edinburgh, London, Glasgow, & Leeds, on representation made by James Milne & Son, Ltd., have expressed their regret, and called in and destroyed the whole issue.

(Signed) JOHNSTON PARK & CO.

JAMES MILNE & SON,
LIMITED,
Milton House Works, EDINBURGH.
and at LONDON, GLASGOW, LEEDS.


...packing pa...
...time was held exclusively by Great ...merica, but at present a great deal is imported from ...
The Eveson Coal & Coke Company, Ltd., of 134, Edmund Street, Birmingham, claim to have promptly fulfilled all their Contracts during this trying winter, and they have still "Spot" lots of Gas-Coal and Cannel for quick delivery.
Wire Netting and Rope.—These goods are extensively used in the mining districts, especially brass ...ng, which is all imported from the ... are extensively used ...

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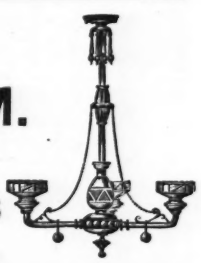
BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.



WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

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SUPPLY FROM STOCK

CAST-IRON RETORTS

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

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Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

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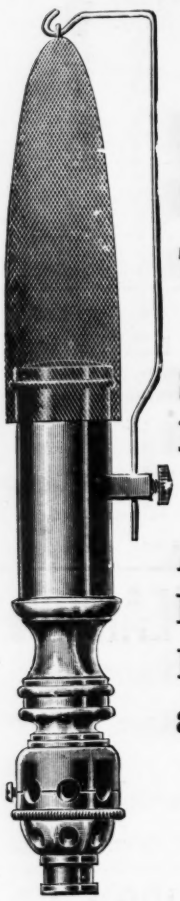
GLASGOW.

[See Illustrated Advertisement, Feb. 6, p. 370.]

THE INTENSIFIED GAS LIGHT COMPANY, LTD.



HIGH-PRESSURE PATENTS.

300 CANDLES PER BURNER

Three Burners consuming 30 cubic feet per hour give a Light of 1000-Candle Power at half the cost of Electric Light.

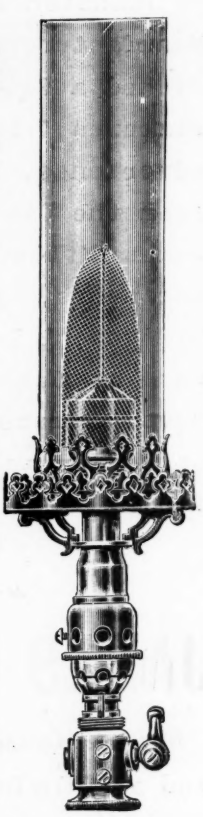
Specially adapted for Lighting Railway Stations, Docks, Sheds, Workshops, Streets and Squares, Shop Windows, &c., &c.

Adopted by the L. & N.W. and Great Central Railways at their Euston and Marylebone Termini, the Crystal Palace, London Pavilion, Mersey and Leith Dock and Harbour Boards, Edinburgh and Leeds Gas Committees, &c., &c., &c.

Specially Low Terms to Gas Companies for Trial Installations.

"The perfection of artificial lighting on the large scale."—"*Journal of Gas Lighting*," April 18, 1899.

ORDINARY GAS PRESSURE PATENTS



The Intensified Company's Improved Incandescent Burner gives **25 CANDLES PER FOOT**, or 60 Candles for $2\frac{1}{2}$ feet. No other Burner on the Market can compare with this. Price, with Mantle and Chimney, from 6s. 6d. Send for Complete Lists.

The most Effective and Economical Burner on the Market for both Indoor and Outdoor Lighting. Mantles specially manufactured for the Company, for both Systems, by the Welsbach Incandescent Gas-Light Company.

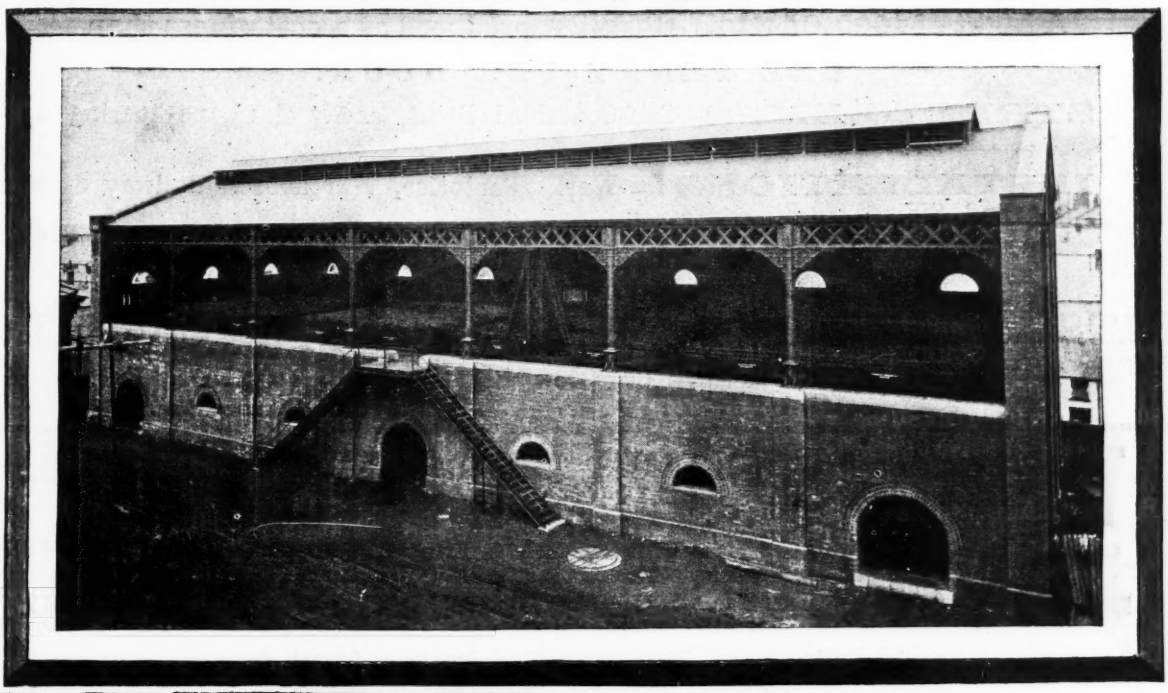
For full Particulars apply to the Company's Works—

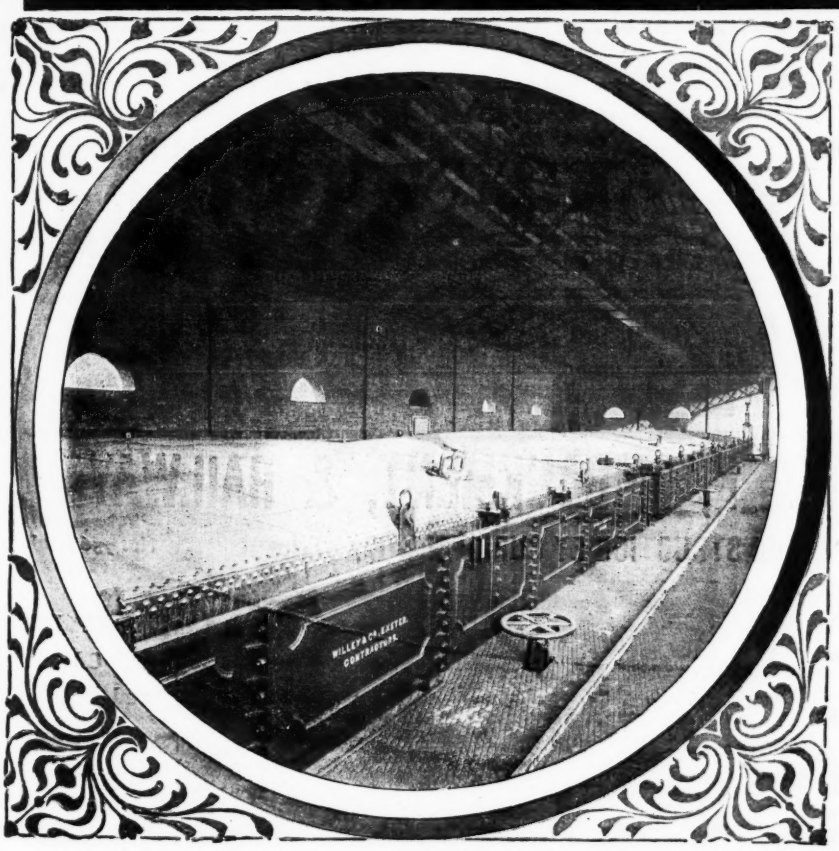
3, WILSON ST., DRURY LANE,

LONDON, W.C.

WILLEY & CO.,

ENGINEERS, IRONFOUNDERS, & CONTRACTORS.





New 30 feet Square

Overhead Purifiers

WITH STAGING, ROOF, 24-IN. VALVES & CONNECTIONS, &C., COMPLETE.

Recently CONSTRUCTED and ERECTED for the

Swansea Gas Co.

To the Design of
THORNTON ANDREWS, Esq., C.E.

CHIEF OFFICES AND WORKS } **ST. THOMAS, EXETER.** Telegrams: "WILLEY, EXETER." Telephone: 132 and 263.

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A SYSTEM OF BURNING VAPOURIZED PETROLEUM WITHIN AN INCANDESCENT MANTLE.

A Light of 1000-CANDLE POWER produced at a cost of less than

ONE PENNY PER HOUR.

STREET-LAMPS—Self-Contained Plant, easily fixed, no tearing up of Thoroughfares.

INSTALLATIONS for Works, Factories, Warehouses, Railway Stations, and Sidings.

SPECIAL TERMS TO GAS COMPANIES.

FOR PRICES AND PARTICULARS, APPLY TO THE

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REGISTERED OFFICE: 137, Victoria Road, DARLINGTON.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

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Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

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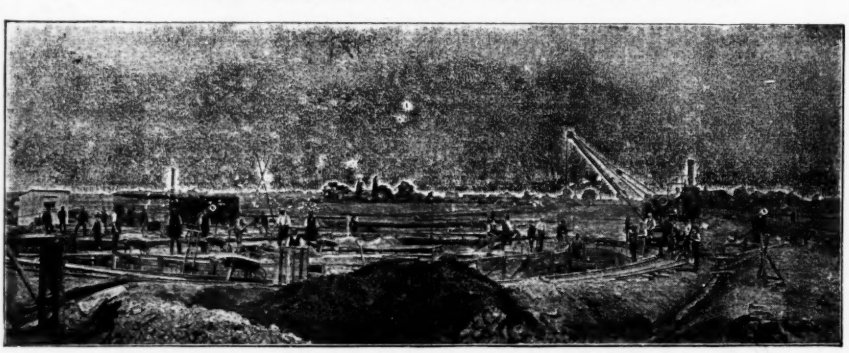
Telegrams: "Robustness, London."

UNDER CONSTRUCTION BY OUR OWN WORKMEN.

Telephone No. 756 Bank.

RESERVOIRS, TRIAL BOREHOLES and WELLS. MAIN and SERVICE LAYING.



COMPLETE GAS and WATER WORKS ERECTED and SET to WORK including ALL MAINS.

J. & H. ROBUS, Engineering Contractors,

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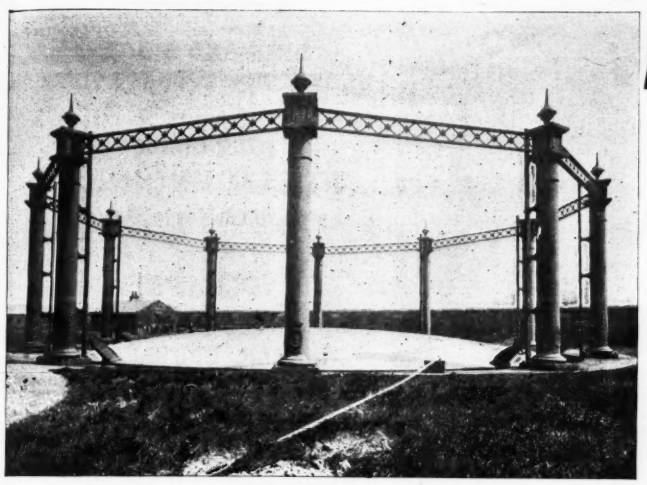
For Carbonizing Advt., see last Issue.

GASHOLDERS



A GASHOLDER

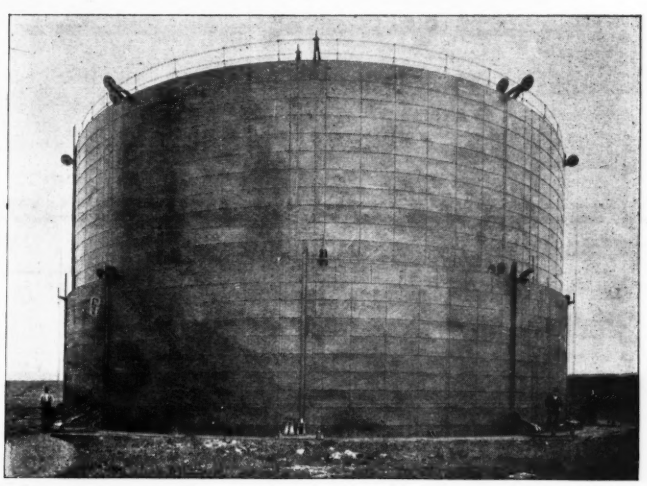
Guided by Ten massive Cast-Iron Columns and Girders is shown in the accompanying Photo.

AS IT WAS

originally erected by us

IN 1883.

We last year took down the Guide-Framing, converted the Holder into a Two-Lift; and this Photo. ☛ shows it



AS IT IS NOW

entirely guided by our Patent Steel Cable System.

In many other instances, Columns have been sold and replaced by our Cables.

We are prepared to alter any Holders in a similar manner to the above. Engineers who have trouble with the irregular working of Column-Guided Holders will find the Cable System vastly superior and quite reliable.

PATENTEES AND SOLE MANUFACTURERS:

ASHMORE, BENSON, PEASE, & CO., LTD.

GAS AND ELECTRICAL ENGINEERS,

MANUFACTURERS OF

Accumulators, Complete Installations for Light and Power, Gasholders (with and without Columns), Purifiers, Scrubbers, Condensers, Washers, Roofs, Girders, Sulphate Plants, Valves, &c., &c.

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Telegrams: "Gasholder, Stockton-on-Tees." "Apparatus London,"

Paris Office: 3, SQ. DES BATIGNOLLES.

Telephone No. 103. Telegraphic Address: "ELEVATOR, HASLINGDEN."

S. S. STOTT & CO.,

ENGINEERS, HASLINGDEN, NR. MANCHESTER.

COAL AND COKE ELEVATORS & CONVEYORS.

COAL AND COKE STORAGE PLANTS.

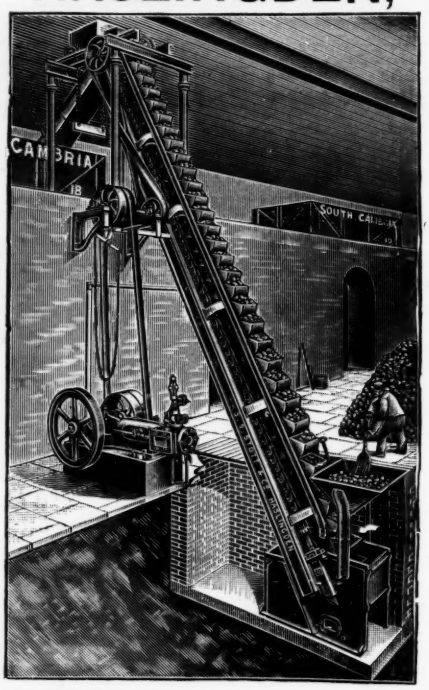
COAL AND COKE BREAKERS.

WHARF ELEVATORS FOR UNLOADING BARGES.

ELEVATORS & CONVEYORS for BOILER-HOUSES.

STAMPED AND RIVETED STEEL ELEVATOR BUCKETS.

DETACHABLE CHAINS AND SPROCKET WHEELS.



Coke Elevator Loading Railway Waggons.

LIME AND OXIDE ELEVATORS & CONVEYORS.

HIGH-CLASS STEAM-ENGINES up to 1000-Horse Power.

PUMPS, HORIZONTAL AND VERTICAL, SINGLE, DOUBLE, or THREE-THROW, for WATER-WORKS, &c.

BEAM PUMPING-ENGINES.

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ESTABLISHED 1844. ORIGINAL MAKERS. ESTABLISHED 1844.

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THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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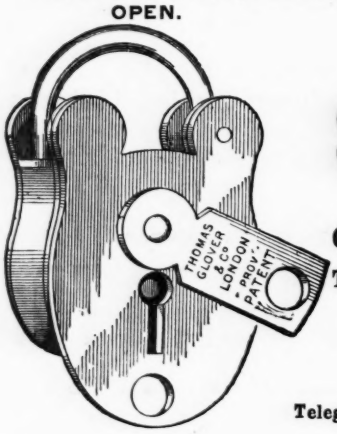

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PATENT

SECURE PADLOCK

PREVENTS TAMPERING WITH THE

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 725, Holborn.

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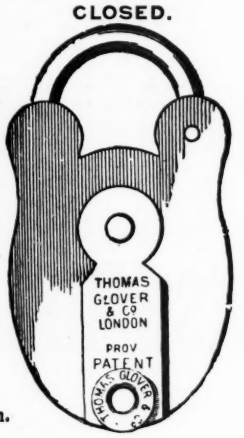

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

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BIRMINGHAM: 1, OOZELLS STREET. *Telegraphic Address: "GOTHIC."*

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BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

Manufacturers of Glasshouse Pots and Crucibles of every kind.
Established 1836.

JOSEPH CLIFF & SONS,
INCORPORATED IN
THE LEEDS FIRE-CLAY COMPANY, Ltd.
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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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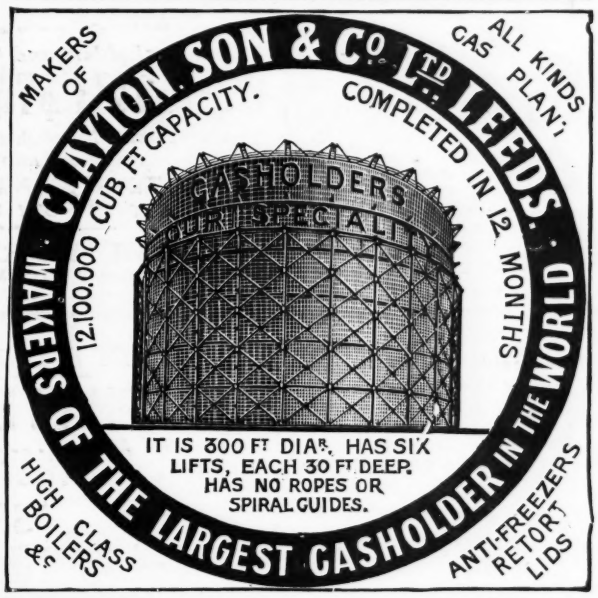
Established 1860.


MAKERS OF
CLAYTON, SON & Co. LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
SPECIALITY
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
IT IS 300 FT DIAR. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

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INTERESTING EXTRACT FROM AN ENGINEER'S LETTER.

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"During the Summer this town was visited by a severe typhoon **LASTING THREE DAYS.** The peculiarity of our typhoon is the wind seems to come in **TREMENDOUS GUSTS** from varying directions. This, of course, tests the stability of any structure; and you will therefore be glad to hear that your **SPIRAL-GUIDED GASHOLDER** stood the trial admirably. Our Gasholders with Columns and Girders were oscillating over 4 inches; but although the spiral was inflated well up in the second lift, there was **NO VISIBLE MOVEMENT.** This is extremely gratifying to me after advising my Directors to adopt your type. Please let me know **IF YOU CAN INCREASE THE STORAGE OF MY OTHER GASHOLDERS ON THIS SYSTEM** by adding additional Lifts."

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MANUFACTURERS OF

Improved Wet & Dry Gas-Meters.

STATION-METERS. LAMP-METERS.

Test Gasholders and General Gas Apparatus.

Brass Main & Lamp Taps. Unions, Ferrules, &c.

The "Falcon" Lamplighter's Torch. Service Cleansers.

SYPHON AND OTHER PUMPS.

WOOD AND WROUGHT-IRON PURIFIER-GRIDS. SCRUBBER BOARDS.

WET AND DRY METERS REPAIRED.

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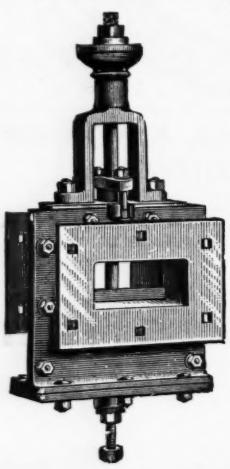
Telegrams: "HUTCHINSON BROS., BARNSLEY."

Telegraphic Address: "CLAPHAM BROS., KEIGHLEY."

National Telephone No: "KEIGHLEY 35."



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—FOR—
ENGLAND, WALES & ABROAD.
RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES.
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FURNACE BUILDERS.
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